Agulhas and Somali Currents Large Marine Ecosystems Project

Capacity Building and Training Component

National Training Plan for

KENYA

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TABLE OF CONTENTS

LIST OF TABLES

1.0 INTRODUCTION

1.1 Background Information of the ASCLME Project

Available knowledge indicates that the Aguhlas and Somali Large Marine Ecosystems (ASCLMEs) region encompasses a high degree of biodiversity and endemism. Both of these Large Marine Ecosystems (LMEs) are considered to be moderately productive based on global primary productivity estimates.

The LMEs have been characterized by Global International water Association (GIWA) as being severely impacted in relation to the overexploitation of fisheries. However, statistics are generally poor, and the precise impact of fishing methods is still speculative. There are clear gaps in the understanding of coastal and marine ecosystems within the ASCLMEs.

Discussion Meeting at the Royal Society, London reviewed current knowledge of the Atmosphere-Ocean-Ecology Dynamics in the Western Indian Ocean and observed that new information is now coming to light regarding the ASCLMEs area which is altering the previous understanding of the complex ocean-atmosphere dynamics in the region and their relationship to ecosystem functions such as productivity, larval transport and fisheries. Previously unknown channels (some over 10km in width and over 100 m deep) have recently been discovered around the Mascarene Plateau (East of Madagascar) which influence the flow of the South Equatorial Current and associated nutrient and productivity relationships.

Species of invertebrates that are new to the area are being discovered and it is expected that many taxa new to science would be identified after analysis of recent collections. Extensive areas of previously unmapped seagrass beds and shallow coral reefs have also been identified. Scientists conclude there is still a great lack of information about the area, not only in absolute terms, but also relative to other oceans such as the Pacific. in order to develop systematic management frameworks for the LMEs and their constitute habitats, a better integration of the information on ecology, oceanography, biophysics and human requirements is needed, as is data in areas where it is lacking and a better understanding of the complex interactions and linkages among the various marine ecosystems.

1.2 Transboundary Issues in the ASCLIME

Better prediction of climatic and oceanographic variability (essential, for example, in the context of rain-fed agriculture, watershed welfare and the management of sustainable marine resources use) is of critical importance to the developing countries of this region. There is also an urgency to synthesise accurate data on the state of the region's artisanal fisheries and its linkages to the physicochemical and biological functions within the LMEs as well as its interactions with the offshore commercial fisheries. Furthermore, there is inadequate data regarding larval transportation and the distribution and welfare of important nursery areas around the coastlines of the LMEs. All of these gives strong justification and impetus to the urgent requirement for gathering baseline information and developing coordinated monitoring and observation systems, as needed to provide a management framework.

1.3 Abatement Activities and Possible Threats

A global effort is currently underway led by the World Conservation Union (IUCN), the Intergovernmental Oceanographic Commission (IOC) of United Nations Educational, Science and

Cultural Organization (UNESCO), other United Nations (UN) agencies (including United Nations Development Programme (UNDP), United Nations Environmental Programme (UNEP) and the World Bank (WB)) and the United States' National Oceanic and Atmospheric Administration to improve the long-term sustainability of resources and environments of the world's LMEs. Within the ASCLMEs region there is a need to implement monitoring efforts on spatial and temporal scales to identify the ecosystem effects of climate change and to discover the major driving forces causing large scale changes in biomass yields. It has been concluded that research assessment and management programmes need to be implemented in order to address long-term governance concerns. The Global Environment Facility (GEF) has developed a strategy (based on lessons from its Benguela Current LME Project) for undertaking such recommended assessments (particularly in areas like the ASCLMEs region where data is limited) and then using this vital information to inform a standard process of Transboundary Diagnostic Analysis (TDA) which in turn provides the foundation for the development of a Strategic Action Programme for cooperative management and better regional governance of LMEs.

There is limited information available on the wider chemical oceanography of the ASCLMEs region. The area is considered to be very oligotrophic and characterised by low nutrient concentration, low phytoplankton biomass and a predominance of regenerated production. Ammonium is found to be the major nitrogen substrate supplying between 50-99% of the phytoplankton nitrogen requirements. Nutrient levels do vary seasonally especially between the monsoons. The Indian Ocean generally is subject to large variations in salinity as a result of drastic changes in rainfall both seasonally and from year to year (again, associated with the monsoons). Sea surface salinity is affected by rainfall, but is also affected by anomalous anticyclonic winds blowing in the southeast Indian Ocean block the transport of saltier water out of the Western Indian Ocean. Winds in the region are seen to effect salinity and rainfall both of which are linked to El Ñino events.

1.4 Management Needs

i) Addressing the issue related to the dynamics of potential anthropogenic activities related to land-water interaction and ocean-atmosphere interface
ii) Addressing the issues of information, data and management of shared fisheries resources
iii) Protection and management of fragile habitats (nursery grounds, migratory routes etc)
iv) Issues of biodiversity and biodiversity hot spots

2.0 OBJECTIVES OF THE ASCLME TRAINING PROGRAMME

2.1 Staff Capacity and Knowledge

To address the CB&T activities, a rapid Training Needs Assessment (TNA) was conducted using a questionnaire administered to the project staff of Kenya Marine and Fisheries Research Institute (KMFRI) in order to identify the existing capacity, gaps and areas that require further training. Table 1 shows the existing capacity of staff participating in the ASCLME and none had a doctorate degree at the moment. All the eight staff who have acquired M.Sc degree also hold B.Sc degrees. The M.Sc. degrees are primarily in Marine Ecology and Fisheries. This means that the staff can be able to handle the basic data collection on:

i) Artisanal fisheries
ii) Larval transport and
iii) Nursery areas along the coast

However, they lack adequate capacity to analyze the dynamic ocean-atmosphere interface and other interactions that define the LMEs, which is a core area of the project.

Table 1: Present qualifications/skills of scientists participating in ASCLME in KMFRI based on 11 respondent questionnaires on rapid Training Needs Assessment (TNA)

Training Acquired	Total
Ph.D	
M.Sc	8
B.Sc	2
Ordinary Diploma:	2
Higher National Diploma:	1
Certificate	1
Cumulative total number trained	22

Similarly, a number of staff have undergone various short term training programmes both internally, at national, regional and international level for periods ranging from a couple of days to a maximum of six months. Some of these training sessions have a positive impact on the ASCLME Project (Table 2). For example, the Advanced Training Programme on Climate Change, Training on Multivariate Analysis and the International Training on Ecosystem Approach to Fisheries are all relevant to the dynamic ocean-atmosphere interface and other interactions that define the LMEs. Training programmes on taxonomy, fish larvae identification and otolith analysis are both relevant to basic data collection on larval transport within the ASCLME Project.

Even though there is some capacity to collect basic marine ecology, fisheries data and environmental data, large gaps exist in the available dataset due to lack of centralized database in Kenya on oceanography, ecology, biology of fisheries and the ocean dynamics. Based on the identified gaps, the following constraints have been identified:

i) Limited data on biodiversity and endemism.
ii) Bathymetric information and underwater profile
iii) Wind regimes and ocean currents
iv) Limited data on nutrients and primary productivity
v) Preliminary data from the Shoals of Capricorn Marine Programme indicate very large, previously uncharted, sea grass beds in the Mascarene Plateau
vi) Coral reef status has been assessed along the coastline of East Africa and throughout the Indian Ocean Island States. Coastal reefs cover an area in total of just under 7,000 km2

There is a clear need for capacity building in data acquisition, archiving, analysis, storage and distribution within the specific research areas of ASCLME and other complementary project in Kenya and in the region to avoid duplication of efforts and to ensure judicious use of available resources.

Table 2: Based on cumulative number and short term field of research training not lasting more than 6 months for 11 respondents and 25 (short term training courses) or cumulative score of 275

Area of short term training	Number Trained	Cum No. Trained	Cum % Trained
1. Advanced International Training Programme on Climate Change – Mitigation and Adaptation	1	1	0.36
2. Advanced international training programme on sustainable coastal development	2	3	1.09
3. Aquaculture Economics	1	4	1.45
4. Coral Reef Restoration and Remediation	1	5	1.82
5. Developing Research Skills (KMFRI), Nairobi, Kenya	1	6	2.18
6. East African wetlands management course	1	7	2.55
7. Environmental Impact Assessment	1	8	2.91
8. Fisheries Observer Training Course	2	10	3.64
9. Globallast Port Survey Taxonomy Workshop - Fish & Sponge taxonomy, Mombasa, Kenya	1	11	4.00
10. International Coral Reef Initiative (ICRI) Committee on Coral Reef Enforcement & Investigation	1	12	4.36
11. International training on Ecosystem approach to fisheries	1	13	4.73
12. Introduction to ODM, UNESCO/IOC project office for IODE, Oostende, Belgium	1	14	5.09
13. Micro dissection, fish larval identification/otolith and microscopy.	1	15	5.45
14. Multivariate Data Analysis	1	16	5.82
15. National short course on ICZM	2	18	6.55
16. Open water diving course	1	19	6.91
17. Personal Safety and Social Responsibilities with Personal Survival Techniques	2	21	7.64
18. Quality Management of fish processing & handling	1	22	8.00
19. Reef Check underwater fish identification	1	23	8.36
20. Receptor-based Toxin Testing for Phytoplankton and Shellfish (IAEA)-South Africa	0	23	8.36
21. Scientific Methodologies in Marine Ecology	1	24	8.73
22. Scientific observer course	1	25	9.09
23. Strategic Management	2	27	9.82
24. SWIOFP training course	2	29	10.55
25. Wetlands and Poverty Eradication	1	30	10.91

Required training in the 22 critical areas relevant to ASCLME during the rapid training needs assessment indicate that only 12% have been cumulatively trained in these areas and about 42% still require further training in these critical areas on a cumulative basis (Table 3). This means that a cumulative training of at least 66% will ensure adequate capacity to handle most aspects of the ASCLME project in terms of skills, data collection and analysis.

Table 3: Based on cumulative number and required training for 11 respondents and 22 key areas for ASCLME or cumulative score of 242

Skills relevant to ASCLME	Cum No Trained	Cum % Trained	Cum No. Requiring Training	Cum % Requiring Training
1. Technical training	4	1.7	2	0.8
2. Economics and socioeconomics	4	1.7	5	2.1
3. Numerical expertise (statistics, applied mathematics etc)	6	2.5	11	4.6
4. Data management and information management skills	6	2.5	17	7.1
5. Legal expertise	6	2.5	20	8.4
6. Language education (general)	9	3.7	20	8.4
7. Governance	9	3.7	24	10.1
8. Fisheries science	12	5.0	28	11.8
9. Physical Oceanography	14	5.8	31	13.0
10. Chemical Oceanography	16	6.6	34	14.3
11. Biological Oceanography	18	7.4	40	16.8
12. ICZM including expertise in GIS and MPA's	18	7.4	48	20.2
13. Aquaculture	21	8.7	49	20.6
14. Environmental Education	21	8.7	53	22.3
15. Training of inspectors and observers, community involvement?	22	9.1	57	23.9
16. Trans-disciplinary training for managers including ecosystem approach	23	9.5	61	25.6
17. Fishing technology, implementing of quality control in industry	25	10.3	66	27.7
18. Environmental monitoring, including pollution and remote sensing	27	11.2	74	31.1
19. Biodiversity	27	11.2	82	34.5
20. Taxonomy and Curation	27	11.2	88	37.0
21. Pollution: land and marine based	28	11.6	91	38.2
22. Environmental Impact Assessment Training	29	12.0	100	42.0

2.2 Data gap analysis and future data requirements

1. However, many of the ecosystem-related functional systems, such as upwelling areas, larvae recruitment zones, nurseries and breeding grounds, areas that demonstrate resistance to coral bleaching, etc., are generally poorly known, despite their great ecological and economic importance for Kenya and the region.
2. Available knowledge indicates that the ASCLMEs region encompasses a high degree of biodiversity and endemism. However, statistics are generally poor, and the precise impact of fishing methods is still speculative. There are clear gaps in the understanding of coastal and marine ecosystems within the ASCLMEs.
3. In order to develop systematic management frameworks for the LMEs and their constituent habitats, a better integration of the information on ecology, oceanography, biophysics and human

resources is required as well as adequate, consistent and reliable data for better understanding of the complex interactions and linkages among the various marine ecosystems.

4. Furthermore, there is inadequate data regarding larval transportation and the distribution and welfare of important nursery areas around the coastlines of the LMEs. All of these observations provide a strong justification and impetus to the urgent requirement for gathering baseline information and developing coordinated monitoring and observation systems to provide a management framework.
5. The exact dispersal mechanisms and range of species remain poorly known, and associated ecological and physical processes need to be studied
6. There is limited information available on the wider chemical oceanography of the ASCLMEs region. The area is considered to be very oligotrophic and characterised by low nutrient concentration, low phytoplankton biomass and a predominance of regenerated production. Ammonium is known to be the major nitrogen substrate supplying between 50-99% of the phytoplankton nitrogen requirements. Nutrient levels do vary seasonally, especially between the monsoon seasons.
7. There is limited documentation on seasonal fluctuations in zooplankton within these LMEs
8. Over 11,000 marine fauna are currently recorded from the Western Indian Ocean (WIO) region (island states included). The species inventory is however incomplete, and there are large gaps in the data set.
    i) Existing data are based largely on fragmented shallow–water surveys. The benthic invertebrates of deeper waters, especially those of the continental slope and abyssal zone remain virtually unexplored.
    ii) Beyond the thirty meter gradient little is known about species diversity and population densities and many species remains to be described.
    iii) According to some projections, less than 50% of the marine species actually present have been described and that, at existing rates of description, it will take 150-200 years to fully describe the remaining fauna.
    iv) The region has a high diversity of marine life, from phytoplankton and zooplankton that drive the fisheries, through several thousand species of larger invertebrates and fish of which many (such as tuna, lobster, shrimp, oysters, clams, etc.) are of economic significance, to charismatic species such as the coelacanth, dugong, turtles and many species of cetaceans.
    v) There are also important seabird populations, particularly on the offshore islands.
9. Seamounts may be rare within the ASCLMEs or around the Mascarene Plateau, but so little is known regarding the bathymetry and topography of certain areas within the region (especially the Mascarene Plateau). The lack of knowledge of the presence of seamounts may be a reflection of the general lack of knowledge for this area.

2.3 Training objectives

The ASCLME Project Objective is “to undertake an environmental baseline assessment of the Agulhas and Somali Current Large Marine Ecosystems to fill information gaps needed to improve management decision-making, and to ascertain the role of external forcing functions (such as the Mascarene Plateau and the Southern Equatorial Current). This information intended for used in developing a Transboundary Diognostic Analysis (TDA) and Strategic Action Plan (SAP) for the Agulhas Current LME, and a TDA for the southern portion of the Somali Current LME”, in line with achieving the Project Objective. The overall project deliverables are:

i) Acquisition of data needed to support an ecosystem-based approach to management of the two LMEs as well as a better understanding of the external forcing functions and linkages to adjacent areas of the Western Indian Ocean region
ii) A full TDA and SAP for the Agulhas Current LME adopted at high levels

iii) An interim TDA and draft management plan that addresses the southern portion of the Somali current LME

The objectives and deliverables are constrained by the following issues:

i) Inadequate data for management purposes
ii) Lack of regionally based monitoring and information systems and coordination
iii) Lack of capacity for comprehensive national and regional ecosystem assessment
iv) Absence of public participation, education and stakeholder involvement schemes

Clearly, the Capacity Building and Training (CB&T) activities are intended to address the third constrain "Lack of national and regional ecosystem level assessment" in the short-term and long-term. In the short term, "short-duration" training opportunities are suitable while in the long-term, more intensive programmes leading to bachelors, masters and doctorate degrees are appropriate but all the training programmes should be related to one or more of the research areas under the ASCLME activities:

i) Productivity
ii) Fish and Fisheries
iii) Pollution and Ecosystem Health
iv) Socio-economic and
v) Governance

At the national level, the pertinent issues are also focused around environmental health, sustainable fish production, economic well-being, governance structures and poverty alleviation in line with contemporary Government policies such as Poverty Reduction Strategy (PRS), Revitalization of Agriculture Sector and Vision 2030 among others.

3.0 INVENTORY OF CURRENT EDUCATIONAL CAPACITY IN KENYA

3.1 General capacity, funding and infrastructure

The current educational training capacity in Kenya is dependent on National Public and Private Universities, University College level (Table 4) to Higher National Diploma/Ordinary Diploma in middle level colleges and Certificated in various Government Training Institutes, Polytechnics and Technical Colleges (Table 5). Whereas university education and training capacity encompasses all spheres of knowledge and education from arts, law, education, science, environment, finance and economics to various engineering courses, the middle level colleges and training institutes are geared more towards various types of technical education.

Table 4: The main university institutions in Kenya, the control category and location

Public Universities	Locality
• Kenyatta University	- Nairobi
• Moi University	- Eldoret
• University of Nairobi	- Nairobi
• Egerton University	- Njoro, Nakuru
• Maseno University	- Maseno, Kisumu
• Jomo Kenyatta University of Agriculture & Technology	- Juja, Thika
• Masinde Muliro University of Science & Technology	- Kakamega
• Kenya Polytechnic University College	- Nairobi
• Kisii University College	- Kisii
• Mombasa Polytechnic University College	- Mombasa
• Multimedia University College of Kenya	- Nairobi
• Pwani University College	- Kilifi
• Narok University College	- Narok
• South Eastern University College	-
• Meru University College of Science and Technology	- Meru
• Bondo University College	- Bondo
• Kabianga University College	- Kericho
• Chuka University College	- Chuka
• Laikipia University College	- Laikipia
• Kimathi University College of Technology	- Nyeri
Private Universities	**Location**
• Aga Khan University	- Highridge, Nairobi
• Daystar University	- Hurlingham, Nairobi
• Great Lakes University of Kisumu (GLUK)	- Kisumu
• Gretsa University	- Thika
• Kabarak University	- Kabarak, Nakuru
• KCA University	- Ruaraka, Nairobi
• Kiriri Women's University of Science & Technology (KWUST)	- Westlands, Nairobi
• Strathmore University	- Nairobi
• United States International University (USIU-A)	- Kasarani, Nairobi
• United States International University (School of Business)	- Kasarani, Nairobi
• University of Eastern Africa, Baraton	- Eldoret
• Mt Kenya University	- Thika

There are a number of institutions offering programmes leading to award of Certificates, Diplomas, Bachelor, Masters and Doctorate Degrees. This report is however more focussed on public institutions

due to Government Policy to award scholarships tenable only in Government training institutions whereas individuals who have resources can pay for their training in any training institution of their choice.

Table 5: The public polytechnics, institutes of technology & technical institutions in Kenya

Institute of Technology and Polytechnics	
• Bandari College	- Mombasa
• Coast Institute of Technology	
• Eldoret Polytechnic	- Eldoret
• Friends College Kaimosi Institute of Technology	
• Government Training Institute (GTI)	- Mombasa
• Gusii Institute of Technology	
• Kenya Forestry College	- Londiani
• Kenya Institute of Applied Sciences	-
• Kenya Utalii College	- Nairobi
• Kenya Water Institute	- South C, Nairobi
• Kenya Wildlife Service Training Institute (KWSTI)	- Naivasha
• Kiambu Institute of Science and Technology	- Kiambu
• Kisumu Polytechnic	- Makasembo, Kisumu
• Mathenge Institute of Technology	
• Moi Institute of Technology	- Rongo, Migori
• Murang'a Institute of Technology	- Murang'a
• Nairobi Institute of Technology	- Westlands, Nairobi
• Ramogi Institute of Science & Technology	- Kisumu
• Rift Valley Institute of Science & Technology	- Nakuru
• Rift Valley Institute of Science and Technology	
• Rwaka Technical Institute	
• Sagana Institute of Technology	- Sagana
• Sang'lo Institute of Technology	
• Siaya Institute of Technology	
• Ukambani Agricultural Institute	
Technical Training	
• Bumbe Technical Training Institute	
• Kabete Technical Training Institute	- Kabete
• Kaiboi Technical Training Institute	
• Kinyanjui Technical Training Institute	
• Kitale Technical Training Institute	
• Maasai Technical Training Institute	
• Machakos Technical Training Institute	
• Mawego Technical Training Institute	- Kendu Bay/Oyugis
• Meru Technical Training Institute	- Meru
• Michuki Technical Training Institute	
• Mombasa Technical Training Institute	- Mombasa
• Nairobi Technical Training Institute	
• N'kabune Technical Training Institute	
• North Eastern Province Technical Training Institute	
• Nyeri Technical Training Institute	
• Ol'lessos Technical Institute	
• Rift Valley Technical Training Institute	- Eldoret
• Sigalagala Technical Training Institute	

- Thika Technical Training Institute

There are a number of highly specialized institutions (Table 6) that are not entirely academic or research oriented but can offer training in various specialized areas and have even developed their own statutory curriculum. One of these institutions is the National Environment Management Authority (NEMA) that has developed the only approved curriculum on Environmental Impact Assessment (EIA) and Environmental Audit (EA) for Kenya. Any training institution desiring to offer these courses must follow the NEMA curriculum for the certificate to be recognized.

Table 6: Specialized institutions in Kenya that may offer training on request

Specialized Institutions	Locality
• Kenya Institute of Public Policy Analysis (KIPPRA)	
• National Environmental Management Authority (NEMA)	
• Kenya School of Law	

Existing facilities and infrastructure to undertake capacity building and training for the ASCLME Project vary considerably between these institutions but there are consistent communalities in the programmes, mode of delivery, admission requirements, field work and grading at these institutions. Whereas there are numerous academic programmes at the universities and other tertiary institutions, the programmes that are relevant to ASCLME CB&T are given prominence in the following sections.

3.1.1 University of Nairobi

The School of Biological Sciences under the College of Biological and Physical Sciences the most relevant in terms of the ASCLME Project for the purposes of training:

School of Biological Sciences

Location
The School of Biological Sciences is located in two buildings (Block 1 and 2) in the College of Biological and Physical Sciences, Chiromo Campus.

Organizational structure
The School is the result of a merger of the two of the oldest and well-known departments of the University - Botany and Zoology in 2006. Its mandate is twofold: firstly to train personnel in the biological field so as to meet the job market in both the academic and industrial spheres, and secondly, to conduct research in relevant basic and applied biological fields.

Programmes
The School of Biological Sciences offers undergraduate and postgraduate courses in the following broad areas: systematic and economic biology, physiology and biochemistry, phytochemistry, cell sciences, molecular sciences and biotechnology, virology, bacteriology and mycology, aquatic sciences, parasitology, immunology and insect sciences. The main programmes that are relevant to ASCLME include:

Undergraduate Bachelor
Bachelor of Science in Biology
Bachelor of Science in Environmental Conservation and Natural Resource Management
Bachelor of Science in Microbiology and Biotechnology

Masters Degrees

- Master of Science in Biology of Conservation
- Master of Science in Genetics
- Master of Science in Hydrobiology
- Master of Science in Microbiology and Biotechnology

PhD

- PhD (Biological Sciences)

School of Physical Sciences

The School of Physical Sciences is now composed of the Departments of Chemistry, Geography and Environmental Studies, Geology, Meteorology, and Physics. The main degree programs in the School are in these five subject areas. Students are however, free to combine subjects from other schools, namely the School of Mathematics and the School of Biological Sciences since they are complementary and both the schools are located on the same campus. Similarly the size and scope of the School of Physical Sciences, which comprises of five (5) Departments and interdisciplinary collaborations (local, regional and international), allows the combination of a wide variety of programmes and options in conjunction with other schools (i.e. School of Biological Sciences, School of Mathematics and School of Computing and Informatics) that belong to the wider College of Biological and Physical Sciences.

Undergraduate Bachelor

- Bachelor of Science
- Bachelor of Science (Geology)
- Bachelor of Science (Meteorology)
- Bachelor of Science in Atmospheric Science
- Bachelor of Science in Environmental Geoscience

Masters Degrees

- Master of Science in Geology
- Master of Science in Meteorology
- Master of Science in Chemistry
- Master of Science in Environmental Chemistry

Postgraduate Diplomas

- Postgraduate Diploma in Environmental and Natural Disaster Management
- Postgraduate Diploma in Meteorology
- Postgraduate Diploma in Operational Hydrology

PhD

- PhD (Chemistry)
- PhD (Geology)
- PhD (Meteorology)

Research

The School is involved in a number of researches within the biological arena and has links with several local and international institutes. in addition it offers services to the general public such as consultancies in various areas, identification of plants and animals, and the sale of biological products,

such as seedlings, mice, insects etc. Presently, the active research activities include various aspects of marine ecology, fisheries and ecosystem research (Table 7).

Table 7: Research activities at the University of Nairobi

Research Title	Collaborators	Inception Year	Funding (USD)
Global Environmental Change Research and Capacity Building in Sub-Sahara Africa.	Panafrican START Secretariat(PASS) Prof. Eric Odada (PI)	2001	5,000,000
Kenya-Belgium Flemish Inter-University Council in Cooperation with The University of Nairobi (VLIR-IUC-UoN Programme) Phase I	VLIR-IUC-UoN Programme Prof. Mavuti (PI), Prof. Waema,Prof.Estambale	1998	5,000,000
Kenya-Belgium Flemish Inter-University Council in Cooperation With The University of Nairobi (VLIR-IUC-UoN Programme)Phase II	VLIR-IUC-UoN Programme Prof. Waema, Prof.K.Mavuti(PI), Prof. Ntiba ,Prof.Estambale, Dr. Omwenga, Dr. Getao	2003	3,713,076
Fisheries, Coastal and Marine/Freshwater Research	Belgian Universities, University of Nairobi and Kenya Marine and Fisheries Research Institute Prof. M.J. Ntiba (PI)	2003	500,000
Integrating Vulnerability and Adaptation to Climate Change into Sustainable Development Policy Planning and Implementation in Eastern and Southern Africa: KENYA Pilot Project	D. Olago, in collaboration with Centre for Science, Technology and innovation (CSTI), and Arid Lands Resource Management Project (ALRMP – GoK). Funded by UNEP-GEF. Olago Daniel	2006	300,000
Assessment of Capacity Building Needs and Country Specific Priorities in Conservation of Biodiversity in Kenya	GEF – UNEP/ Prof. T. K. Mukiama (PI)	2000	244,000
Establishing Molecular Biology and Biotechnology Laboratory	Rockefeller Foundation/ Dr. Dorington O. Ogoyi (Pi)	2005	164,286
Establishment of a Molecular Biology and Biotechnology Laboratory at The College of Biological and Physical Sc.	Rocker fellow Foundation/ Prof. Opiyo Ochanda (PI)	2003	150,000
Fisheries Resources of The Western Indian Ocean Text Book	WIOMSA –Zanzibar Prof. M.J. Ntiba and Dr. N.N. Gichuki	2007	

In the School of Physical Sciences, the most recent research undertakings that are relevant to ASCLME include:

i) Ecosystem health in Kenya's wildlife conservation areas such as Marine Parks
ii) Biofuel use and greenhouse gas emissions from biomass burning in Kenya
iii) Dissipation, distribution, metabolism and uptake of pesticides in tropical ecosystems including sea water, sediments, soils and fish
iv) Assessment of impact and adaptation to climate change
v) The analysis of chemical pollution in Kenyan water systems
vi) Environmental Science technologies. Environmental Pollution Monitoring and Risk Assessment

Staff strength
Academic Staff of the School of Biological Sciences consist of 44 academic faculty members while that of the School of Physical Sciences has 39 staff members. in the School of Physical Sciences, 10 members are Professors, 19 have PhD and the remaining 10 have at least Masters qualification.

Facilities and equipment
The school has well equipped teaching and laboratories at Chiromo campus and a field laboratory at Moana in the South Coast of Mambasa. The school was the first to purchase and install an electron microscope among the public universities in Kenya.

Funding level of programmes and research
Funding level from the treasury is limited and bulk of research funding comes from projects as listed above and bilateral/multilateral collaboration with partners nationally, regionally and internationally.

Linkages
The School of Biological Sciences has had a long academic relationship with Belgian Universities, Leicester University in UK, Austrian Academy of Science and various American Universities.

Fees
Local students

Undergraduate	1,000-2,500 US$ (850-2,100 €)
Postgraduate:	Not available

3.1.2 Kenyatta University

School of Pure and Applied Sciences

Location
The School of Pure and Applied Sciences is located next to the University's Graduation Square.

Organizational structure
The School is headed by a Dean who coordinates the 7 teaching Departments each headed by a Chairman. The 8 Departments are:
i) Department of Chemistry
ii) Department of Biochemistry & Biotechnology
iii) Department of Plant & Microbial Sciences
iv) Department of Physics
v) Department of Mathematics
vi) Department of Zoological Sciences

Undergraduate Programmes

Chemistry Department
B.Sc. (Analytical Chemistry)
M.Sc. (Applied Analytical Chemistry).

Biochemistry and Biotechnology Department
Bachelor of Science (General)
Bachelor of Science (Biochemistry)
Bachelor of Science (Biotechnology)

Graduate Programmes

Department of Biochemistry and Biotechnology

i) The Department has Ph.D. students in various disciplines that are related to what we offer. The Ph.D. degrees are based on research alone and take between 3 and 4 years maximum.
ii) For M.Sc. the mode of study is based on the units system. The course duration is 2 years. Taught course work takes one year and thesis takes the second year.
Master of Science (Biochemistry)
Master of Science (Biotechnology)

Zoological Sciences

The Department of Zoological Sciences is part of the School of Pure and Applied Sciences. It offers courses to students of the School of Education and the School of Environmental Studies and Human sciences. The department cooperates with the Department of Plant and Microbial Sciences so that units from the two departments can be combined to produce degree courses in microbiology and crop protection. A similar cooperation exists between the department and the Department of Biochemistry to produce degree courses in Biochemistry and Biotechnology.

Research

The Department of Chemistry is actively involved with research in Natural products, Analytical Chemistry, Organic Chemistry, Physical Chemistry, Environmental Chemistry, and other interdisciplinary projects while the Department of Biochemistry is undertaking various research projects in population genetics, plant transformation studies and medicinal Plants. The Department of Zoological Sciences staff members and postgraduate students are involved in research in aquatic sciences, biological control of crop pests, disease control, immunology, biodiversity conservation, population studies and molecular biology

The School of Pure and Applied Sciences, in response to market demands, the University Strategic Plan 2015, and Government of Kenya (GoK) Vision 2030 has developed the following new programmes:

Bachelor of Science in Statistics
Bachelor of Science in Cell and Molecular Biology
Bachelor of Science in Microbiology, Marine & Coastal Resource Management
Master of Science in Integrated Watershed Management.

School of Environmental Studies

Department of Environmental Planning and Management

The School of Environmental Studies and Human Sciences was created in July 2003. It conducts teaching and research over the broad range of areas which is crucial to understanding the interactions between the natural and human components of the environment. We train environmental and human scientists and managers, conduct research on key sustainability questions, and interact with government, communities and other agencies, in finding out and implementing solutions to problems facing humanity. The programmes offered in the school include:

Undergraduate

Bachelor of Science in Environmental Planning and Management

Postgraduate

Masters of Science in Environmental Planning and Management

Postgraduate Diploma

Bachelor of Science in Environmental Planning and Management

Staff strength

The Department of Chemistry consists of 29 academic members comprising of professors, Ph.D holders and Masters holders on staff development here and abroad. The Department of Biochemistry has 24 staff members who are qualified in various disciplines such as Applied Biotechnology, Biochemistry, Biotechnology, Bacteriology, Pathology, Pharmacology and Genetics. The Department of Zoological Sciences has a competent academic staff of 21 of whom 19 are Ph.D. holders. There are 3 professors and 7 senior lecturers. The academic staff members are specialised in different areas including Aquatic Sciences, Ecology, Cell and Molecular Biology, Entomology, Immunology, Parasitology, Physiology, Evolutionary Biology.

Facilities and equipment

Regarding infrastructural development, science laboratories have been put up with the allocation of six (6) of them with a capacity of six hundred (600) students to our departments. This has eased the congestion in the laboratories in the school.

Linkages

Through the departments, the School has a vast network of active scientific links with other institutions of higher learning, specialized organizations, industries and related government agencies and departments all aimed at acquainting students early with high level research and preparation for the job market.

The Department of Chemistry has an active link with: Nagasaki University, Iowa State University and Louisiana State University Department of Chemistry, Universität Paderborn, Paderborn, Germany Department of Natural Products Chemistry, University of Barcelona, Barcelona, Spain. Other links include, Kenya medical Research Institute (KEMRI), Kenya Forest Research Institute (KEFRI), Kenya Agricultural Research Institute (KARI), International Centre for Insect Physiology and Ecology (ICIPE). The Department of Biochemistry has linkages with several research institutes such as International Livestock Research Institute (ILRI),International Centre of Insect Physiology & Ecology (ICIPE), Kenya Medical Research Institute (KEMRI), Kenya Agricultural Research Institute (KARI), The University of Nairobi, College of Heath Sciences, Kenya Medical Training Centre (KMTC).The Department of Zoological Sciences has linkages with national institutions such as KEMRI, KARI, Kenya Wildlife Services (KWS), and National Museums of Kenya (NMK). It also has links with international institutions such as International Livestock Research Institute (ILRI), ICIPE. Thus the students get acquainted early enough with high level research.

Fee Structure

Fees for identified courses range from KES 131,200 for bachelors degrees to KES 232,300 per annum for PhD programmes. The fee structure of the programmes relevant to ASCLME is indicated in Table 8 below.

Table 8: Kenyatta University fee structure per annum for programmes relevant to ASCLME

Code	School/Programme	Tuition	Statutory	Total
School of Engineering And Technology				
J261	Diploma in Information Technology	72,000.00	21,200.00	93,200.00
J31	Bachelor of Information Technology	130,000.00	21,200.00	151,200.00
School of Economics				
K14	Bachelor of Economics	110,000.00	21,200.00	131,200.00
K16	Bachelor of Economics and Finance	110,000.00	21,200.00	131,200.00
K24	Bachelor of Economics and Statistics	110,000.00	21,200.00	131,200.00
K102	Master of Economics	120,000.00	22,700.00	142,700.00
K96	Ph.D in Economics	200,000.00	32,300.00	232,300.00
School of Humanities and Social Sciences				
C168	Certificate in Japanese	40,000.00	16,500.00	56,500.00
C169	Certificate in German	40,000.00	16,500.00	56,500.00
C170	Certificate in French	40,000.00	16,500.00	56,500.00
School of Pure and Applied Sciences				
120	Bachelor of Science (B.Sc)	110,000.00	21,200.00	131,200.00
128	Bachelor of Science (Biotechnology)	120,000.00	21,200.00	141,200.00
172	Bachelor of Science (Biochemistry)	120,000.00	21,200.00	141,200.00
173	Bachelor of Science (Analytical Chemistry)	120,000.00	21,200.00	141,200.00
181	Bachelor of Science (Microbiology)	120,000.00	21,200.00	141,200.00
190	Bachelor of Science (Biology)	120,000.00	21,200.00	141,200.00
156	Master of Science	130,000.00	22,700.00	152,700.00
184	Ph.D in Science	200,000.00	32,300.00	232,300.00
School of Law				
L95	Bachelor of Laws	150,000.00	21,200.00	171,200.00
L100	Master of Law			
L101	Ph.D in Law	200,000.00	32,300.00	232,300.00
School of Education				
E08	Bachelor of Library and Information Science	110,000.00	21,200.00	131,200.00
E83	Ph.D in Education	200,000.00	32,300.00	232,300.00
School of Environmental Studies				
N163	Certificate in Environmental Health	40,000.00	16,500.00	56,500.00
N36	Bachelor of Environmental Planning & Management	120,000.00	21,200.00	141,200.00
N38	Bachelor of Environmental Science	110,000.00	21,200.00	131,200.00
N39	Bachelor of Environm. Studies (Community Dvpt)	110,000.00	21,200.00	131,200.00
N76	Bachelor of Environmental Studies (Env. Res. Cons)	110,000.00	21,200.00	131,200.00
N80	Bachelor of Science (Environmental Education)	110,000.00	21,200.00	131,200.00
N50	Master of Environmental Studies	130,000.00	22,700.00	152,700.00
N85	Ph.D in Environmental Science	200,200.00	32,300.00	232,300.00

3.1.3 Jomo Kenyatta University of Agriculture and Technology

Organizational structure

Jomo Kenyatta University of Agriculture and Technology has strength in technological training and agriculture due to the history associated with its development. It however has a Faculty of Science that offers programmes in the following departments:

Faculty of Science

1. Department of Botany
2. Department of Chemistry
3. Department of Physics
4. Department of Statistics and Actuarial Science
5. Department of Biochemistry
6. Department of Zoology
7. Department of Pure and Applied Mathematics

It has a reasonable capacity in information technology programmes based at the Institute of Computer Science and Information Technology in the following departments:

1. Department of Computing
2. Department of Information Technology

Programmes

The most relevant programmes for the ASCLME at Jomo Kenyatta University of Agriculture and Technology are:

Bachelor of Science (Information Technology)
Bachelor of Business Information Technology
Master of Science Environmental Management & Legislation
Diploma in Information Technology
Certificate in Information Technology

Research

Some of the ongoing relevant research at Jome Kenyatta University of Agriculture and Technology (JKUAT) that are also relevant to Marine Environmental Data Analysis (MEDA) output include the following:

i) Integrating GIS and Remote Sensing in Mapping and Management of Water Resources by Dr. Waithaka H. E, M. Kasahara, C. M. Kamamia, Waore E. N. and Kapoi K. .
ii) Flood Vulnerability and risk assessment using GIS and Remote Sensing by Dr. Waithaka H. E, M. Kasahara, C. M. Kamamia, Waore E. N. and Kapoi K.
iii) Use of open-source resources for community-based GIS in developing countries by Dr. Moses Murimi Ngigi.
iv) Applications of GIS/Remote Sensing in tourism promotion by Charles B. Wasomi
v) Minimum and maximum values versus conventional average values in linear spectral unmixing by Dr. Thomas. G. Ngigi.
vi) Overcoming unknown-mixture-model problem in spectral unmixing percentages normalisation curves by: Dr. Thomas. G. Ngigi
vii) Mix-unmix Classifier: spatial distribution of end-members by Dr. Thomas. G. Ngigi
viii) Application of genetic algorithm in the optimization of solar tent fish dryer by Kituu M., Shitanda D. Kanali, C. L., Mailutha J. T and Njoroge G. N.
ix) Investigations on Implementation and Compliance of environmental Management Systems By Companies by Companies in Kenya by Victor Mutua

Staff strength
The university has about 200 academic staff but their distribution within Departments and by areas of speciality are not easily available.

Linkages
Some of the linkages with external universities that are still active are highlighted in Table 9 below:

Table 9: Linkages at Jomo Kenyatta University of Agriculture and Technology

SN	Institution	Collaborating department	Date of signing
1	University of Applied Sciences Belgium	Chemistry	2008/2013
2	Masinde Muliro University College	CEP	2007/2012
3	University of Reading	Faculty of Science	2004/2009
4	Okayama University, Japan	Faculty of Agriculture	2006/2011
5	Masinde Muliro University, Western	Faculty of Engineering	2006/2011
6	Kaiser Latern University, Germany	Science Faculty	2006/2011
7	La Sapienza, Italy	ICSIT & Statistics Department	2007/2012
8	Berlin-Nairobi Exchange	Faculty of Science	2007/2012
9	University of Sunderland	ICSIT	2009/2010
10	Lubeck University of Applied Science, Finland	SABS	2008/2013
11	Oslo School of Architecture, Sweden	SABS	2008/2013
12	Pennsylvannia State University , Usa	RPE	2008/2013
13	Kaduna Polytechnic, Nigeria	Nairobi CBD	2008/2013
14	Kansas State University, Usa		2008/2013
15	African Advanced/Level Telecomm. Inst.. Nairobi	ICSIT	2009/2013
16	Nagoya University, Japan	Horticulture	2009/2014
17	Wuhan Botanical Gardens, China	Zoology	2009/2014

3.1.4 Egerton University

Faculty of Environment and Resources Development

Location
The faculty of Environment and Resource Development is located in the main campus of Egerton University.

Programmes
Department of Environmental Science
Certificate in Environmental Impact Assessment
Bachelor of Science in Environmental Science
Master of Science in Environmental Science
Doctor of Philosophy in Environmental Science

Department of Geography
Certificate in Geographical Information Systems

Faculty of Science

Departments of chemistry, biochemistry & molecular biology, computer science & biological sciences
Bachelor of Science in Chemistry
Bachelor of Science in Biochemistry

Bachelor of Science in Applied Aquatic Science
Bachelor of Science in Zoology
Master of Science in Chemistry
Diploma in Modern Chemistry and Laboratory technology

Facilities and equipment
The faculty is based at Egerton University's main campus at Njoro so our students have easy access to all university facilities. Besides, this, the faculty has modern laboratories that include: GIS Lab.

Linkages
The faculty of Environment and Resources Development has established linkages with other world class academic and research institutions like: University of Western Ontario Canada, Utah State University, International Livestock Research Institute (ILRI), Association of Sustainable Agriculture Research in Eastern and Central Africa (ASARECA), and National Environment Management Authority.

Faculty of Science

Fee Structure
Diploma Programmes

All Diploma programmes	KES 70,000

Degree Programmes

Art based	KES 90,000/=
Science based	KES 110,000/=
Engineering based	KES 130,000/=
Other fees will range from	KES 2000/=
For bridging and other short courses	KES 14,900

For diploma and Degree programmes.
The indicated fees do not include Catering and Accommodation

Regular Programmes

Tuition per year	KES 16,000/=
Other fees	KES 14,900/=

3.1.5 Moi University

Location
Moi University is located in Rift Valley Province at Eldoret town

Organizational structure
The relevant organization to ASCLME includes the School of Natural Resource Management that houses the Departments of:

i) Fisheries and Aquatic Sciences
ii) Wildlife Management and
iii) Forestry/ Wood Science

The School of Environmental Studies consists of the Divisions of:

i) Environmental Ecology
ii) Human Ecology
iii) Environmental Economics

The School of Information Science offers courses relevant to information sciences, Information and Communication Technology (ICT) and Global Information System (GIS). In addition, the School of Environmental Science offers courses in Environmental Impact Assessment, GIS and

Programmes

The programmes relevant to ASCLME CB&T include the following:

School of Natural Resource Management

Bachelors Programmes
- B.Sc Wildlife Management
- B.Sc Fisheries & Aquatic Science

Diploma Programmes
- Diploma in Aquaculture and Fisheries Management

Graduate Programmes
- M. Sc. Aquaculture
- M. Sc. Fisheries Management
- M. Sc. Aquatic Science
- Ph. D in Fisheries management
- Ph. D in Aquaculture
- Ph. D in Aquatic Sciences

School of Science
- M. Sc. (Biostatistics)
- Ph. D. (Biostatistics)

School of Environmental Studies
- M.Phil in Environmental Biological Sciences
- M.Phil in Environmental Economics
- M.Phil in Environmental Human Ecology
- M.Phil in Environmental Law
- M.Phil in Environmental Information System
- M.Phil in Environmental Physical Sciences
- D.Phil in Environmental Biological Sciences
- D.Phil in Environmental Health
- D.Phil in Environmental Economics
- D.Phil in Environmental Human Ecology
- D.Phil in Environmental Law
- D.Phil in Environmental Information System
- D.Phil in Environmental Physical Science

Research

The Moi University Act gives the University the Mandate to carry out Research. The University undertakes technically oriented research both in the basic and applied disciplines. The Research Projects are expected to; maintain strong relationships with communities, conform to the broad National objectives, supplement teaching and solve problems of the rural communities. Research activities are

carried out in the University teaching departments and are coordinated, monitored and evaluated by the University Research Committee through the office of the Deputy Vice Chancellor (Research and Extension).

Funding level of programmes and research
The University sets aside funds as the University Research Fund (URF) given out as University Research Grants to competitive Project Proposals from the University Research Community. The University Research Grants often does not meet its demand and members of the university apply for grants from other sources. The results of the University Research Projects are disseminated through field days organized by the Projects, stakeholders meetings, conferences and are presented during the Moi University Annual Research Conference and other conferences. Project findings are published as University Publications in the Conference Proceedings and University Journals.

Linkages
Iin recognition of the need for multidisciplinary involvement in achieving pragmatic solutions to the myriad human problems, the research units collaborate with researchers within and without the University to provide a distinct research density at the 'Centres of Research Excellence'.

Fees
Local students
Undergraduate 1,000-2,500 US$ (850-2,100 €)
Postgraduate 1,000-2,500 US$ (850-2,100 €)
International students
Undergraduate 1,000-2,500 US$ (850-2,100 €)
Postgraduate 1,000-2,500 US$ (850-2,100 €)

3.1.6 Maseno University

School of Environment and Earth Science

Undergraduate Programmes
Bachelor of Earth Science with IT
Bachelor of Environmental Science with IT

Masters Programme
MSc. in Environmental Science

PhD Programmes
Ph.D in Environmental Science

Department of Zoology

M.Sc in Aquatic Sciences
Ph.D in Aquatic Sciences

3.1.7 Masinde Muliro University of Science and Technology

Location
Masinde Muliro University of Science and Technology is located in Kakamega town in Western Province.

Organizational structure

Centre for Disaster Management and Humanitarian Assistance; Faculty of Education and Social Sciences; Institute of Graduate Studies and Research Extension; School of Open Learning and Continuing Education; Faculty of Science and Engineering.

Programmes

Faculty of Science:

Undergraduate

- Bachelor of Science in Biology
- Bachelor of Science in Biological Resources Conservation and Management
- Bachelor of Science in Environmental conservation and management
- Bachelor of Science in Information Technology
- Bachelor of Science in Chemistry

Postgraduate

- M.Sc in Statistics
- M.Sc in Chemistry
- Ph.D in Mathematics (Statistics)
- Ph.D in Chemistry

Research

Research activities at Masinde Muliro University of Science and Technology (Table 10) showing the thematic area, year, status, principal investigators, collaborators, title, source of funding and amount committed.

Table 10: Research activities at Masinde Muliro University of Science and Technology

Financial Year	Research Status	Principal Researcher	Proposal Title	Funding agency/ Donor	Amount Disbursed to date (KES)
2007	Ongoing	Mr. A. M. Marifa	Morphodynamic Processes on the Beaches and their Environmental Management Implications: A Case Study on the Nyali, Bamburi and Shanza Beaches in Mombasa	URF	50,000/-
2007	Completed	Ms. C. K. Onyancha	Artificial Groundwater Recharge of Kilifi District using GIS for Appropriate Design	URF	295,580/-
2010	Ongoing	Dr. Humphrey W. Nyongesa	Interactive Effect of Organic-based Biofertilizers on Soy Bean Yield, Nitrogen Fixation and Soil Fertility in BUSIA district Kenya.	URF	327,500
2010	Ongoing	Ms. Susan Choge	The use of Information Communication Technology in teaching the Kiswahili novel".	URF	362,000

Fees

Local students

Undergraduate	1,000-2,500 US$ (850-2,100 €)
Postgraduate	1,000-2,500 US$ (850-2,100 €)

International students

Undergraduate	1,000-2,500 US$ (850-2,100 €)
Postgraduate	1,000-2,500 US$ (850-2,100 €)

3.2 Evaluation of training activities, including short courses, ongoing mentorship, training of trainers, language issues, availability and selection of trainees

3.2.1 Universities and Training Programmes

To facilitate proper evaluation of the training programmes in the public universities in Kenya, each of the universities uses a unique code for identification (Table 10). This coding system facilitates the identification of programmes and clusters of programmes offered by each or several universities that are relevant to ASCLME CB&T activities.

Table 11: University codes used in the report are as follows

CUC	Chuka University College
EGER	Egerton University
JKUAT	Jomo Kenyatta University of Agriculture & Technology
KPUC	Kenya Polytechnic University College
KSUC	Kisii University College
KU	Kenyatta University
KUC	Kimathi University College
MMUST	Masinde Muliro University of Science & Technology
MPUC	Mombasa Polytechnic University College
MSU	Maseno University
MU	Moi University
MUC	Meru University College
NUC	Narok University College
PUC	Pwani University College
UON	University of Nairobi

3.2.1.1 Regular Training Programmes

Economics and Socioeconomics

There is adequate capacity to train personnel at both undegraduate and postgraduate levels in most of the public universities in economics and socio-economics. The courses and course titles however have some variations but the content is more generic than the course titles. The following courses are offered at both undergraduate and graduate levels in the public universities in Kenya:

Bachelor Programmes

CUC Bachelor of Arts (Economics and Sociology)
CUC Bachelor of Science (Economics & Statistics)
EU Bachelor of Arts (Economics and Sociology)
EU Bachelor of Science (Economics & Statistics)
KU Bachelor of Economics
KU Bachelor of Economics & Finance
KU Bachelor of Economics and Statistics
MSU Bachelor of Arts (Economics with IT)
MU Bachelor of Arts (Economics)
NUC Bachelor of Arts (Economics)

UON Bachelor of Economics
UON Bachelor of Economics & Statistics

Graduate Programmes
EGER Master of Arts Economics.
EGER Master of Arts Sociology.
KU Master of Economics (Development)
KU Master of Economics (Econometrics)
KU Master of Economics (Environment)
KU Master of Economics (Finance)
KU Master of Economics (International Trade and Finance)
KU Master of Economics (Policy and Management)
MSU Doctor of Philosophy in Economics
MSU Doctor of Philosophy in Sociology
MSU Master of Arts in Economics
MU Master of Philosophy (Economics)
UON Masters of Arts in Economic Policy Management
UON Masters of Arts in Economics
UON Masters of Arts in Economics of Multilateral Trading Systems

Numerical Expertise (Statistics, Applied Mathematics etc)

Training expertise in statistics and related studies is well established at both undergraduate and graduate levels. The programmes available lead to the award of Bachelor, Masters and Doctorate degrees in the respective disciplines. It is worth noting that training opportunities in this area cuts across many fields and many programmes are integrated with economics and biostatistics. The choice of programme to select is therefore determined by the individual's needs in particular areas of specialization. The following programmes are offered in the respective universities:

Bachelor Programmes
CUC Bachelor of Science (Economics & Statistics)
EU Bachelor of Science (Economics & Statistics)
KU Bachelor of Economics and Statistics
KU Bachelor of Science (Statistics)
UON Bachelor of Economics & Statistics
UON Bachelor of Science (Statistics)

Graduate Programmes
EGER Master of Science in Applied Mathematics
EGER Master of Science in Biostatistics & Biometrics
EGER Master of Science in Statistics
MMUST Master of Science in Applied Mathematics
MMUST Master of Science in Statistics
MMUST Master of Science in Mathematical Statistics
MMUST Doctor of Philosophy in Mathematics (Pure Mathematics)
MMUST Doctor of Philosophy in Mathematics (Statistics)
MU Doctor of Philosophy (Biostatistics)
MU Master of Philosophy (Biostatistics)
UON Master of Science in Statistics
UON Master of Science in Applied Mathematics

UON Master of Science in Social Statistics

Data Management and Information Management Skills

The training and capacity building in data and information is so diverse in Kenya and also cuts across many disciplines. Information technology training in many institutions is integrated with statistics, computing, business, library and publishing. Both undergraduate and graduate programmes are available in all public universities in Kenya:

Bachelor Programmes

JKUAT Bachelor of Business Information Technology
JKUAT Bachelor of Science (Information Technology)
JKUAT Certificate in Information Technology
JKUAT Diploma in Information Technology
KUC Bachelor of Science (Information Technology)
MMUST Bachelor of Science (Information Technology)
MSU Bachelor of Science (Applied Statistics with IT)
MU Bachelor of Science (Information Sciences)
MU Bachelor of Science (Information Sciences)
MU Bachelor of Science in Informatics
MU Bachelor of Science (Applied Statistics with Computing)
MUC Bachelor of Business and Information Technology
MUC Bachelor of Science (Information Technology)
NUC Bachelor of Science (Applied Statistics with Computing)
NUC Bachelor of Science (Information Science)

Graduate Programmes

MMUST Master of Science Information Technology
MSU Doctor of Philosophy in Environmental Science
MU Master of Philosophy (Information Technology)
MU Master of Philosophy (Library and Information Studies)
MU Master of Philosophy (Publishing Studies)
MU Master of Philosophy (Records and Archives Management)

Legal Expertise

Only three public universities offer undergraduate programmes Leading to Bachelor in Law (LL.B) while only two (University of Nairobi and Moi University) offer graduate programmes. University of Nairobi offers Masters in Law (LL.M) while Moi University specifically offers a programme leading to Doctorate in Environmental Law.

Bachelor Programmes

KU Bachelor of Law (LLB)
MU Bachelor of Law (LL.B)
UON Bachelor of Law (LL.B)

Graduate Programmes

MU Doctor of Philosophy in Environmental Law
UON Masters of Law (LL.M)

Language Education (General)

All programmes at undergraduate level leading to Bachelor of Arts have options for general language education. However, specialized languages offered in French and German in some programmes at the undergraduate level. Graduate programmes however concentrate more on the linguistics other than just languages.

Undergraduate Programmes

EU	Bachelor of Arts
KU	Bachelor of Arts
KU	Bachelor of Education (Arts) French
KU	Bachelor of Education (Arts) German
MMUST	Bachelor of Education (French)
MSU	Bachelor of Arts (with IT)
MU	Bachelor of Arts
MU	Bachelor of Arts (French)
MU	Bachelor of Arts (German)
PUC	Bachelor of Arts
UON	Bachelor of Arts

Graduate Programmes

EGER	Master of Arts in English Language and Linguistics.
EGER	Master of Arts in Linguistic (Linguistics)
EGER	Master of Arts Kiswahili.
EGER	Master of Science in Languages
MMUST	Master of Education in Kiswahili
MSU	Doctor of Philosophy in Linguistics

Governance

Training and capacity building opportunities in governance can also be found at undergraduate and graduate levels in Kenya. All Bachelor of Arts training programmes have optional courses geared towards issues of Governance. The issues covered range from public administration to political science, conflict resolution, public administration, international relations to diplomacy. Even though the capacity to train in this area has existed in the country for over 40 years, the concept of governance has been streamlined into the existing academic programmes only in recent years.

Undergraduate Programmes

EU	Bachelor of Arts
KU	Bachelor of Arts
MSU	Bachelor of Arts International Relations and Diplomacy (with IT)
MSU	Bachelor of Arts Political Science (with IT)
MU	Bachelor of Arts
PUC	Bachelor of Arts
UON	Bachelor of Arts

Graduate Programmes

JKUAT	Master of Science ICT Policy & Regulation
MMUST	Doctor of Philosophy in Conflict Management and Conflict Resolution

MMUST Doctor of Philosophy in Peace and Conflict Studies
MMUST Masters in Diplomacy and International Relations
MSU Doctor of Philosophy in Political Science
MSU Master of Arts in International Relations
MSU Master of Arts in Political Science
UON Masters of Arts in International Studies
UON Masters of Arts in Political Science and Public Administration

Fisheries Science

Training capacity in Kenya in fisheries science has been carried out in the past under departments of zoology and natural resources in the University of Nairobi, Kenyatta University and Egerton. All programmes in biology and zoology have limited components of fisheries science. Since 1990, Moi University started specialized programmes leading to Bachelors Degree in Fisheries and Aquatic Sciences. Thereafter, all other public universities have incorporated fisheries science training in either biological sciences or aquatic science programmes at undergraduate level.

At graduate level, University of Nairobi offers a Masters Degree programme in hydrobiology which is basically aquatic ecology and fisheries science. Moi University has developed Masters and Doctorate programmes in Fisheries Management, Aquaculture and Aquatic Ecology. Kenyatta University and Maseno University offers graduate programme in Aquatic Ecology while Kenyatta University offers an additional programme in Fisheries Sciences.

Undergraduate Programmes
KU Bachelor of Science (Biology)
MMUST Bachelor of Science (Biology)
MU Bachelor of Science (Fisheries and Aquatic Sciences)
SEUCO Bachelor of Science (Biology)
UON Bachelor of Science (Biology)

Graduate Programmes
KU Master of Science Aquatic Ecology
KU Master of Science in Ecology
KU Master of Science in Fisheries Sciences
MSU Doctor of Philosophy in Aquatic Sciences
MSU Master of Science in Aquatic Sciences
MU Master of Science in Fisheries (Fisheries Management)
MU Masters of Science in Fisheries (Aquaculture)
MU Masters of Science in Fisheries (Aquatic Sciences)
UON Master of Science (Hydrobiology)
MU Doctor of Philosophy (Fisheries)

Oceanography

Training in Oceanography in Kenya is spread through several programmes in Biology, Ecology, Chemistry and Biochemistry, Environmental Studies and Aquatic Science training programmes. There is no single programme in Kenya that trains specifically in Oceanography (physical, chemical and biological) at undergraduate or postgraduate level. However, at the graduate level, the available training is focused on Biological, Chemical and partly Chemical and Physical Oceanography, Fisheries Management and Aquatic Resource Management in addition to Policy and Legal Frameworks.

Undergraduate Programmes

KU	Bachelor of Science (Biology)
MMUST	Bachelor of Science (Biology)
MU	Bachelor of Science (Fisheries and Aquatic Sciences)
UON	Bachelor of Science (Biology)

Graduate Programmes

MU	Master of Science in Fisheries (Fisheries Management)
MU	Masters of Science in Fisheries (Aquaculture)
MU	Masters of Science in Fisheries (Aquatic Sciences)
UON	Master of Science (Hydrobiology)
MU	Doctor of Philosophy (Fisheries)

Coastal Zone Management Including Expertise in GIS and MPA's

A number of generic programmes in biology, aquatic ecology and fisheries sciences cover issues related to coastal zone management. There are stand alone programmes at graduate level on Geographical Information System but many Universities and Colleges run short courses in GIS and remote sensing to build the capacity of students and those already working in the field on modern mapping tools demand in the job market. Such short courses are available at the Kenya Polytechnic, Kenya Institute of Surveying and Mapping and Regional Centre for Mapping of Resources for Development among other institution.

Undergraduate Programmes

KU	Bachelor of Science (Biology)
MMUST	Bachelor of Science (Biology)
MU	Bachelor of Science (Fisheries and Aquatic Sciences)
UON	Bachelor of Science (Biology)

Graduate Programmes

EGER	Doctor of Philosophy in Natural Resources Management
EGER	Master of Science in Natural Resources Management
EGER	Master of Science in Water Res and Environmental Management
MSU	Doctor of Philosophy in Aquatic Sciences
MSU	Master of Science in Aquatic Sciences
MU	Master of Science (Fisheries - Fisheries Management)
UON	Master of Science (Hydrobiology)
UON	Master of Science in Biology of Conservation
UON	Master of Science in Geographical Information System
UON	Master of Science in Information Systems
UON	Master of Science in Land and Water Management

Aquaculture

The main training institutions in aquaculture in Kenya include University of Nairobi, Moi University, Kenyatta University and Egerton University. However, specific programmes targeting training of professional aquaculturists are relatively few apart from Moi University which offers training at Masters and Doctorate levels in Aquaculture.

Undergraduate Programmes
MU Bachelor of Science (Fisheries and Aquatic Sciences)

Graduate Programmes
EGER Master of Science in Zoology
KU Master of Science in Fisheries Sciences
MSU Doctor of Philosophy in Aquatic Sciences
MSU Master of Science in Aquatic Sciences
MU Doctor of Philosophy (Aquaculture)
MU Master of Science (Aquaculture)
UON Master of Science (Hydrobiology)

Environmental Education

The only programme that has been identified during this survey on environmental education is offered at Kenyatta University at Masters level. This means that there are likely to be wide gaps in training and capacity building on environmental education in Kenya. However, there are some middle level colleges such as Kenya Wildlife Training Institute (KWTI) that offer training programmes in environmental education.

Graduate Programmes
KU Master of Science (Environmental Education)

Training of Inspectors & Observers, Community Involvement? (MCS, Including Pollution etc)

No institution has yet been identified in Kenya that trains inspectors, observers and Monitoring Control and Surveillance (MCS) officers on a regular basis. However, issues of pollution control and environment are handled by the National Environment Management Authority (NEMA). The institution has in addition provided guidelines on the standards of acceptable curriculum on training on Environmental Impact Assessment (EIA) and Environmental Audit (EA).

Trans-Disciplinary Training for Managers Including Ecosystem Approach

Two programmes that have the capacity of multi-disciplinary training for managers are the graduate programmes at Moi University and University of Nairobi, with provision for thesis studies on fisheries modelling, ecosystem modelling and bio-economic modelling of fisheries. Other programmes are:

Graduate Programmes
MU Master of Science (Fisheries - Fisheries Management)
UoN Master of Science (Hydrobiology)

Graduate Programmes
MU Doctor of Philosophy (Fisheries)

Fishing Technology, Implementing of Quality Control in Industry

Moi University offers undergraduate programmes that embrace the concept of fishing technology at both undergraduate and graduate levels. The programme is designed to cover areas such as fishing

crafts and gears, post harvest technology, fish processing and quality assurance and issues of compliance and standards using approaches such as Good Agricultural Practices (GAP), International Standards Organization (ISO), Hazard Analysis Critical Control Point (HACCP) and Codex Alimentarius. University of Nairobi and Egerton University also offer undergraduate and postgraduate programmes respectively on food processing but does not specifically target fish processing.

Undergraduate Programmes

MU	Bachelor of Science (Fisheries - Fisheries Management)
UoN	Bachelor of Science (Food Processing)

Graduate Programmes

MU	Master of Science (Fisheries - Fisheries Management)
EGER	Master of Science (Food Processing Technology)

Environmental Monitoring, Including Pollution and Remote Sensing

Programmes on environmental training and capacity building in Kenya have phenomenally grown since 1990s when issues on environment and development reached global scale. Many of the programmes on environment are available at both undergraduates and graduate levels. Training in environmental issues have been streamlined with issues on biodiversity, poverty, population growth, global warming, deforestation and modern technology of remote sensing and GIS. The capacity and ability to train in environmental issues at undergraduate and graduate levels within Kenya can be classified as medium.

Undergraduate Programmes

EGER	Master of Science (Environmental Science)
KU	Bachelor of Environmental Studies (Science)
KU	Master of Science (Environmental Health)
MSU	Bachelor of Environmental Studies (with IT)
MU	Bachelor of Environmental Studies (Science)
MU	Master of Science (Environmental Health)
PUC	Bachelor of Environmental Studies (Science)

Graduate Programmes

EGER	Doctor of Philosophy in Environmental Science
MMUST	Master of Science Environmental Biology
MU	Master of Philosophy in Environmental Biological Sciences
MU	Master of Philosophy in Environmental Economics
MU	Master of Philosophy in Environmental Information System
MU	Master of Philosophy in Environmental Law
MU	Master of Philosophy in Environmental Physical Sciences
MU	Master of Philosophy in Environmental Planning and Management

Biodiversity

Most of the training opportunities on biodiversity in Kenya have been linked to issues of conservation, especially after Kenya ratified the Convention on Biological Diversity (CBD). Biodiversity training in Kenya has also been streamlined with modern technology including; genetic studies using PCR techniques in all spheres of biodiversity ranging from plants, primates, mammals, fish and microbes. Apart from the mainstream academic training institutions in Kenya, several other public and private organizations are involved in various research activities on biodiversity such as Kenya Medical

Research Institute (KMRI), National Museums of Kenya (NMU), International Centre for Insect Physiology and Ecology (ICIPE), International Laboratories Research on Animal Diseases (ILRAD) among others.

Undergraduate Programmes

KU	Bachelor of Science (Biology)
MMUST	Bachelor of Science (Biology)
MU	Bachelor of Science (Fisheries and Aquatic Sciences)
SEUCO	Bachelor of Science (Biology)
UON	Bachelor of Science (Biology)
UON	Bachelor of Science (Env. Conservation and Natural Resource Management)
UON	Bachelor of Science (Microbiology and Biotechnology)

Graduate Programmes

KU	Master of Science in Genetics
MU	Master of Science (Fisheries - Fisheries Management)
UON	Master of Science (Biology of Conservation)
UON	Master of Science (Hydrobiology)
UON	Master of Science (Microbiology and Biotechnology)
UON	Master of Science (Plant Ecology)
UON	Master of Science in Biology of Conservation
UON	Master of Science in Genetics
UON	Master of Science in Land and Water Management

Taxonomy and Curation

The academic institutions that offer training and capacity building in Kenya have the capacity to train on taxonomy at both undergraduate and graduate levels. The institutions also have some limited capacity for curation. Majority of these institutions however collaborate very closely with the National Museums of Kenya (NMK) that has the infrastructure, space and personnel to carry out collection of specimen for taxonomic work and curation. The NMK therefore accepts specimen from other institutions for taxonomic and curation purposes under various programmes, agreements and projects.

Undergraduate Programmes

KU	Bachelor of Science (Biology)
MMUST	Bachelor of Science (Biology)
MU	Bachelor of Science (Fisheries and Aquatic Sciences)
SEUCO	Bachelor of Science (Biology)
UON	Bachelor of Science (Biology)
UON	Bachelor of Science (Biology)

Graduate Programmes

MU	Master of Science (Fisheries - Fisheries Management)
UON	Master of Science (Hydrobiology)

Pollution: Land and Marine Based

The various training programmes in the academic institutions offer the basic concepts on pollution abatement in general at the undergraduate level but are more specialized at graduate level. For example, environmental chemistry is more specialized and geared towards expertise in chemical

monitoring of pollution while environmental and natural resource management are biological approached to mitigating environmental pollution. In this case, there is no training programme specifically geared towards training in pollution control.

Undergraduate Programmes

MU	Bachelor of Science (Fisheries and Aquatic Sciences)
UON	Bachelor of Science (Env. Conservation & Nat. Resource Management)

Graduate Programmes

MU	Master of Science (Fisheries – Aquatic Sciences)
UON	Master of Science (Hydrobiology)
UON	Master of Science in Environmental Chemistry

Environmental Impact Assessment Training

There are many courses offered in the academic institutions on environment at both undergraduate and graduate levels. These course are meant to train an all round environmentalist in Kenya. However, NEMA has standardized curriculum on Environmental Impact Assessment (EIA) and any institution offering courses on EIA has to follow this pre-defined curriculum. The EIA curriculum is only a two week training programme and can not constitute a full degree programme on its own. The approved EIA curriculum has therefore been streamlined into the wider environmental science training programmes in Kenya in all the academic institutions. Since the EIA module is well defined, many academic institutions with capabilities in environmental sciences offer a two-three week EIA training as a short course for interested individuals.

Undergraduate Programmes

EGER	Bachelor of Science (Environmental Science)
KU	Bachelor of Environmental Studies (Science)
KU	Bachelor of Science (Environmental Health)
MSU	Bachelor of Environmental Science (With It)
MSU	Master of Science in Environmental Science
MU	Bachelor of Environmental Studies (Science)
MU	Bachelor of Science (Environmental Health)
MU	Bachelor of Science (Fisheries and Aquatic Sciences)

Graduate Programmes

EGER	Doctor of Philosophy in Environmental Science
KU	Master of Environmental Science
KU	Master of Environmental Studies (Agroforestry & Rural Development)
KU	Master of Environmental Studies (Community Development)
KU	Master of Environmental Studies (Planning and Management)
MMUST	Master of Science Environmental Biology
MU	Master of Philosophy in Environmental Biological Sciences
MU	Master of Philosophy in Environmental Economics
MU	Master of Philosophy in Environmental Information System
MU	Master of Philosophy in Environmental Law
MU	Master of Philosophy in Environmental Physical Sciences
MU	Master of Philosophy in Environmental Planning and Management

3.2.1.2 Short Term and Custom Tailored Training Programmes in Marine Sciences

1. University of Nairobi
   The short term courses in Nairobi University are geared towards Certificate and Diploma programmes that span from six months to 12 months or 18 months of instruction.

2. Kenyatta University
   The short term courses in Nairobi University are geared towards Certificate and Diploma programmes that span from six months to 12 months or 18 months of instruction.

3. Egerton University
   i) Certificate in Chemistry, Science and Laboratory Technology (Main campus only) Self Sponsored Programme (SSP) only.
   ii) Certificate in Information Technology (SSP only)
   iii) Certificate in Environmental Impact Assessment
   iv) Certificate in Geographical Information Systems

4. Jomo Kenyatta University of Agriculture and Technology
   The short term courses in Nairobi University are geared towards Certificate and Diploma programmes that span from six months to 12 months or 18 months of instruction.

5. Masinde Muliro University of Science and Technology
   The short term courses in Nairobi University are geared towards Certificate and Diploma programmes that span from six months to 12 months or 18 months of instruction.

6. Moi University
   The following short courses offered at Moi University are considered relevant to ASCLME Project:
   i) Fisheries Statistics and Data Processing
   ii) Fisheries Data Collection and Processing
   iii) Training Course for Fish Quality Inspectors
   iv) Project Planning and Management
   v) Aquatic Resources Planning and Management
   vi) Integrated Coastal Zone Management
   vii) Food Health Quality Management (HACCP) and ISO 9000
   viii) Environmental Impact Assessment (EIA)

3.2.1.3 Admission Requirements

Egerton

Diploma Programs

The minimum requirements for a Diploma program is an aggregate of C (plain) attained at one sitting in the Kenya Certificate of Secondary Education (KCSE)with an minimum of C in Mathematics, at least two science subjects and in English or Kiswahili, OR a certificate from a recognized training institution with a minimum of a credit.

Bachelor of Science Degrees

To be admitted for a pre-service degree program, a prospective candidate must have all the requirements set up by the Joint Admission Board (JAB), with a prospective in-service student must have completed a diploma program in the relevant field and graduated with at least a CREDIT.

Masters/Doctoral Degrees

Entry requirements for a master program is at least an Upper Second Class Honours Degree from a recognized University while a doctoral program requires one to have a Masters Degree.

Kenyatta University

Bachelor of Science (Conservation Biology)

A student wishing to pursue a degree in Conservation Biology (B. Sc Conservation Biology) must satisfy the minimum Kenyatta University and School of Pure and Applied Sciences entry requirements.
A student to be admitted must satisfy any of the following minimum requirements:

1. Must have passed Biology or Biological Science at K.C.S.E with C+ in Biology, plus at least a C+ in any two of the following subjects; Physical Sciences, Physics, Chemistry, Geography and Agriculture
2. Have a minimum of 2 principal passes one which must be biology in the Kenya Advanced Certificate of Education (KACE),
3. Have a C plain in KCSE or Division III in Kenya Certificate of Education (KCE) or East Africa Certificate of Education (EACE) with a credit pass at diploma level in any of the following areas: Forestry, Education (Biology, Agriculture), Wildlife, or Wetlands or any other relevant applied science programme from an institution recognized by the University Senate.

Masters Degree Programmes

A student wishing to pursue a masters degree in the Department of Plant and Microbial Sciences must satisfy the minimum entry requirements for Kenyatta University and School of Pure and Applied Sciences entry requirements.
A student to be admitted must satisfy any of the following minimum requirements:

1. Must be a holder of Bachelor of Science or Education with at least Second Class Upper Division and has studied a relevant area of specialization to a degree level.
2. Holders of Second Class, Lower Division Degree in the above areas may be admitted provided the candidate can show proven evidence of research ability or have a minimum of two years work experience in a relevant field.

3.2.1.4 Selection Process

Selection is based on merit for all programmes in the universities

3.2.1.5 Duration

Undergraduate degrees usually run for four academic years or eight semesters (2 each academic year) while masters programmes is 2 years and doctorate programmes takes three to four years. However, it is not unusual for doctorate programmes to take up to 6 years to complete

Kenyatta University

Bachelors Programme

A student who meets minimum entry requirements 2 and 3 above may at the discretion of the Department be eligible for credit waiver as per the Kenyatta University Policy on credit waiver. in each year of study, a student will be required to take all the twelve (12) core units. Each student will also be required to enrol for the required University Common Units. In addition, a field attachment for 3 months at the end of third year of study is compulsory in order to qualify for the award of the degree. During the fourth year of the study, student will be required to take a project lasting two semesters. The project will be equivalent to 2 taught units.

Duration and pattern

i) The Masters programme shall extend over a period of at least eighteen months from the date of registration and shall consist of coursework, examination and thesis involving full-time attendance at the university. Part time students should get more information from Dean of Graduate School.
ii) During the first year of study each student will be required to follow a programme comprising a minimum of eight units and a maximum of ten units. The second year will be devoted entirely to a research project
iii) At the end of coursework, a student is expected to write a research proposal and give a seminar in the department
iv) Students should consult their supervisors for more information and guidance. On commencing research, a progress form should be filled every six months. The form can be obtained from Dean, Graduate School.
v) No candidate for the master's degree shall be registered as full-time student for more than three years, or as part-time students for more than four years without completing the programme of study, or submitting a thesis, as may be the case, without the permission of Senate.

3.2.1.6 Timing of the Programmes

Most of the programmes start in August/September of every year and end in May/June. There are usually two semesters in one academic year lasting 16 weeks each and this time period includes the semester examinations.

3.2.1.7 Programme Structure

Continuous assessment in terms of tests, laboratory exercises, term papers, oral presentations constitute 30% of the examination while the main examination constitutes 70% of the marks at undergraduate level. At graduate level, continuous assessment constitutes 40% and main examination constitutes 60%. Thesis is usually assessed out of 70% and the oral defence takes 30%. Slight variations may exist is some specialized courses that require more practical approach such as swimming, scuba diving and water safety that may be assessed of 70% for continuous assessment and 30% for the written examination.

3.2.1.8 Language of Instruction

The language of instruction in all the public universities, private universities and other tertiary institutions is English.

3.2.1.9 Cost of Programme

As per indicated fee but living expenses are not included in the costing. The average living expenses is about KES 15,000.00 per month for undergraduate students, KES 20,000.00 per month for Masters students and KES 25,000.00 for Doctorate students.

3.2.1.10 Ranking and Prioritizing Strength of Each Institution by Expertise

Based on the relevance of the programmes to ASCLME, the staff strength, research capabilities and linkages to other programmes within the schools/universities and collaboration, the following ranking was done for preferential research area training for the ASCLME. University codes used in the report are as follows (Table 12):

Table 12: University codes and their strength in training based on the number and type of courses offered

ASCLME Areas	CUC	EGER	EU	JKUAT	KU	KUC	MMUST	MSU	MU	MUC	NUC	PUC	SEUCO	UON	Total
Aquaculture		1							1						2
Biodiversity					2		1		2				1	10	16
Coastal Zone Management Including Expertise In GIS and MPA's		3			1		1	2	2					6	15
Data Management and Information Management Skills				4		1	2	2	8	2	2				21
Economics and Socioeconomics	2	2	2		9			4	2		1			5	27
Environmental Education					1										1
Environmental Impact Assessment Training		2			6		1	2	9						20
Environmental Monitoring, Including Pollution and Remote Sensing		2			2		1	1	8			1			15
Fisheries Science					4		1	2	6				1	2	18
Fishing Technology, Implementing Of Quality Control In Industry									2						2
Governance			1	1	1		3	5	1			1		3	16
Language Education (General)		4	1		3		2	2	3			1		1	17
Legal Expertise					1				2					2	5
Numerical Expertise (Statistics, Applied Mathematics etc)	1	3	1		2		5		2					5	19
Oceanography					1		1		2					2	6
Pollution: Land And Marine Based									2					3	5
Taxonomy And Curation					1		1		2				1	3	8
Training of Inspectors & Observers, Community Involvement? (MCS, etc)															0
Trans-Disciplinary Training for Managers Including Ecosystem Approach									1					1	2
Total	3	17	5	5	34	1	19	20	51	2	3	3	3	43	209

Training Programme	CUC	EGER	EU	JKUAT	KU	KUC	MMUST	MSU	MU	MUC	NUC	PUC	SEUCO	UON	Total
Bachelor	3	1	5	2	19	1	7	7	21	2	3	3	3	16	93
Certificate				1											1
Diploma				1											1
Doctorate		3					4	7	2						16
Masters		13		1	15		8	6	28					27	98
Total	3	17	5	5	34	1	19	20	51	2	3	3	3	43	209

3.3 Technical training facilities (including government training programmes)

3.3.1 The Kenya Polytechnic

The Kenya Polytechnic (Dept. of Surveying and Mapping) offers training in Land Surveying, Photogrammetry and Cartography at Diploma and Higher Diploma level. The Department also offers short courses in Geographic Information System (GIS).

3.3.2 Mombasa Polytechnic

The Department if Information Technology was established in February 1987, motivated by the need to centralize computing as a service unit and offer training in computing. Currently the department offers training on regular and part-time basis, at Higher Diploma, Diploma and Certificate level in Information and Technology. The Department was scheduled to offer its first Degree program in Bachelor of Information Science (BTECH) from January, 2010.

BSc. in Information Technology
Higher Diploma in Computer studies – Institute of Management Information Sciences (IMIS)
Diploma in Information Technology
Diploma in Information Communication Technology
Certificate in Library and Information Studies
Certified Information Communication Technology
Certificate in Information Technology
Cisco Certified Network Associate (CCNA)
Certificate in Computer Maintenance and Network Technology.
Certificate in Archives and Record Management
Certificate in Computer System and Application
Certificate in Information Technology Essential (CITE)
Advanced Certificate in Information Technology

The Department of Environmental Health in the faculty of Applied and Health Sciences currently offers training in 1) Environmental Sciences and 2) Environmental and Health Sciences. All these programs are currently being offered at Diploma level. However plans are underway to launch degree programs. The Environmental science course is aimed at developing a knowledge base on the biological and physical environment leading to exploration of human dependence on technological control and interactions with the environment. Emphasis is placed on sustaining resources and making informed choices concerning environmental issues

Diploma in Environmental Health
Diploma in Environmental Sciences

Minimum requirements for programmes

Pre-Certificate and Certificate Programmes
Diploma Programmes
Degree Programmes
Masters Programmes
PhD. Programmes

Pre-Certificate and Certificate Programmes

The entry requirement for admission to a Pre-Certificate programme shall be minimum of KCSE D+ (plus) or its equivalent as well as other requirements as may be specified for the programme by the

respective faculties. The entry requirement for admission to a certificate programme is a minimum of KCSE C- (minus) or its equivalent as well as other requirements as may be specified for the programme by the respective faculties. Admission to a certificate programme examinable by a professional body is in accordance to the requirements and conditions set by the professional body such as Kenya Medical Association (KMA).

Diploma Programmes
Candidates must have a minimum qualification of Kenya Certificate of secondary Education (KCS.E) and achieved a minimum grade of C plain. The minimum entry qualification for the subject cluster is determined by the respective faculties. Candidate with a Division Three of the Kenya Certificate of Education (KCE) or equivalent may be admitted at the discretion of the department. Candidates who hold at least a Certificate in the relevant field from a recognized institution are usually considered to be eligible for admission. Equivalent qualifications from other countries are determined by the Academic Board.

Degree Programmes
For a candidate to be admitted to undertake a Bachelors Degree Programme, he/she must meet the following requirements:

i) Minimum aggregate of C+ in Kenya Certificate of Secondary Education (KCSE) for direct entry.
ii) Those with a Diploma from Mombasa Polytechnic University College or recognized Diplomas from recognized Institution.
iii) Degree from a recognized University in relevant field.
iv) 'A' level candidates with two principal passes in relevant subjects.
v) Certified Public Accountants (CPA), Certified Public Secretaries (CPS) and Certified Institute of Purchasing and Supplies (CIPS) for Commerce and Arts.
vi) Higher Diploma in relevant fields.
vii) Equivalent qualifications from other countries as determined by the Academic Board

Fee Structure

Diploma in Environmental & Health Sciences. Fees Semester I:Kshs 38,865/= Other Semesters: Kshs 33,865 each	KCSE Mean Grade C (Plain) with C- (minus) in Chemistry, Biology, English or Kiswahili; a pass in Physics or Maths, or a Certificate in a related field.	6 Semesters Full-Time
Diploma in Environmental Sciences. Fees Semester I:Kshs 38,865/= Other Semesters: Kshs 33,865 each	KCSE Mean Grade C (Plain) with C- (minus) in Chemistry, Biology, English or Kiswahili; a pass in Physics, or Maths ,or a Certificate in a related field	6 Semesters Evening Classes

3.3.3 The Kenya Institute of Surveying and Mapping

The Kenya Institute of Surveying and Mapping (KISM), established in 1994 offers training in Land Surveying, Cartography, Photogrammetry and Remote Sensing. Courses are offered at Diploma and Higher Diploma level. The Institute also offers short courses in Global Positioning System (GPS) and in Global Information System (GIS).

3.3.4 Regional Centre for Mapping of Resources for Development

Regional Centre for Mapping of Resources for Development, formally Regional Centre for Services in Surveying Mapping and Remote Sensing is based in Nairobi, Kenya. The centre serves the Eastern Central and Southern Africa. The centre offers short courses in Surveying, GPS and GIS among others.

3.3.5 Bandari College

The Kenya Maritime Authority (KMA) has its own Maritime College in Mombasa where specialized training is available not only to its staff but to a much wider community. The college was founded in 1980 to provide training courses for all members of staff, from dock workers to senior managers. Over the years, however, the college has opened its doors to a much wider community of students and has a national and even international reach. Bandari College is located on Mombasa Island and is overlooking the Kilindini Channel. The college is used to host regional and international conferences, courses, seminars and workshops.Kenya Ports Authority (KPA) staff are offered courses in:

i) Port operations
ii) Technical
iii) Administration and management
iv) Marine.

For school leavers, the college offers a nine-month course to obtain a foundation certificate in maritime studies. This can be followed by a diploma course. The college offers courses for coxswains of tugmasters, operators of crane/winch and fork-lift trucks which are always in demand from transport and warehousing operators. Special courses are also run in collaboration with other institutions including Jomo Kenyatta University of Agriculture and Technology and Kenya International Freight and Warehousing Association. Seafarers wishing to obtain an STCW certificate, as required by the International Maritime Organisation, are also catered for by Bandari College.

The college has a range of modern facilities which can be hired for conferences, seminars and workshops. These include:

i) Air conditioned auditorium with modern audio/video equipment and seating for 500 people.
ii) Air conditioned conference hall and committee room with seating for 30 and 40 people.
iii) Three laboratories with personal computers.
iv) Maritime library with some 11,000 books, magazines and periodicals.
v) Student hostels with 60 single rooms and 10 suites, all air conditioned.
vi) Modern kitchen and dining hall with seating for 400 people.
vii) Large scenic garden overlooking the Kilindini Channel available for garden parties and other outdoor events.
viii) Fully equipped civil and marine engineering training workshops.

3.4 Research institutions

3.4.1 Kenya Marine and Fisheries Research Institute (KMFRI)

Kenya Marine and Fisheries Research Institute (KMFRI) has the mandate to carry out research in all areas of aquatic sciences and advice the managers and the Government on suitable management measures on fisheries, aquatic health, aquatic environment, conservation and related purposes. KMFRI covers research and development in both marine and fresh waters and has laboratories equipped with basic facilities for water sampling, chemical oceanography, physical oceanography and biological

oceanography. KMFI has in the past hosted various projects and programmes in marine sciences such as RECOSCIX, Fundamental and Applied Marine Ecology (FAME) and others.

3.4.2 Kenya Medical Research Institute (KEMRI)

The Kenya Medical Research institute (KEMRI) is a Government Research Institution that carries out research health related issues and has major centres spread over the country. The institution is responsible for developing new medical treatment approaches, monitoring and control of diseases. The main areas of concern are: malaria, HIV/AIDs, Tuberculosis among others. KEMRI has a wide collaboration with the American Government especially the Centre for Disease Control (CDC) and Walter Reed (WR) Malaria Project. It has state of the art laboratories for diagnostics, genetics and biochemistry.

3.4.3 Kenya Institute for Public Policy Research and Analysis (KIPPRA) Web site

The Kenya Institute for Public Policy Research and Analysis (KIPPRA) is an autonomous public institute formally established in 1997 through Legal Notice No. 54 in the Kenya Gazette of 9th May 1997. The Institute, however, became operational in 1999. In November 2006, the KIPPRA Bill was passed in Parliament. KIPPRA operates legally under the KIPPRA Act of 2006.

The Institute undertakes the following activities:

i) Conducts objective research and analysis on public policy issues with the goal of providing advice to policy makers;
ii) Provides advisory and technical services on public policy issues to the Government, Government agencies, and other stakeholders.
iii) Collects and analyses relevant data on public policy and disseminates its research findings to a wide range of stakeholders through workshops/conferences, internal seminars, distribution of research publications, policy briefs, and the newsletter.
iv) Develops and maintains research resources and databases on public policy and related issues, and avails these to the Government, the private sector and academic institutions;
v) Undertakes contracted public policy research and analysis for the Government and clients from the private sector;
vi) Undertakes capacity building activities for Government officers; and
vii) Serves as a point of contact and encourages exchange of views between the Government, private sector and other bodies.

3.4.4 National Museums of Kenya

The main activities of National Museums of Kenya (NMK) with respect to ASCLME are curation and biodiversity inventorizing of aquatic resources of the marine environment. The NMK has various departments concerned with museum specimen collection, identification and curation. The NMK holds the main biodiversity reference collection in Kenya

3.4.5 National Environment Management Authority (NEMA)

The National Environment Management Authority (NEMA) is established under the Environmental Management and Coordination Act (EMCA) No. 8 of 1999, as the principal instrument of government in the implementation of all policies relating to the environment.

The Authority became operational on 1st July 2002 following the merger of three government departments, namely: the National Environment Secretariat (NES), the Permanent Presidential Commission on Soil Conservation and Afforestation (PPCSCA), and the Department of Resource Surveys and Remote Sensing (DRSRS). However, following government restructuring in March 2003, DRSRS reverted to its departmental status under the then Ministry of Environment and Natural Resources (MENR).

3.5 Regional and international NGOs (including industry) Programmes with CB&T components

Survey of training programmes in the institutions taking into consideration the following:

i) Regular, short term and custom tailored training programmes in Marine Sciences relevant to ASCLME
ii) Admission requirements of the training programmes and selection process
iii) Duration, timing of the programmes and programme structure including language of instruction
iv) Costs of the training programmes
v) Ranking and prioritizing strength of each institution by expertise

WWF – BIODIVERSITY CONSERVATION

East African Coast

From coastal forests and savannah woodlands to mangroves and coral reefs, East Africa's coastline is one of the continent's most biologically diverse areas. WWF is working to conserve these important habitats, which are home to abundant wildlife and sustain the livelihoods of millions of people.

The coasts of Kenya, Tanzania and Mozambique offer a rich mosaic of coral reefs, mangroves, lowland forests and savannah woodlands. On shore, one finds elephants, black rhinos and red colobus monkeys. At sea, one finds whales, marine turtles, dugongs and large fish populations.

Though many pristine areas remain intact, overfishing, unchecked development, demand for timber and the rapid increase in coastal populations are having a significant impact on the biodiversity of the Easter Africa Eco-region.

Coastal conservation

WWF is working with partners at the local, national and regional level to secure a healthy environment along the coast of East Africa.

This will be achieved by:

i) Helping coastal communities sustainably manage natural resources for their own benefit;
ii) Strengthening national legislation and management systems for sustainable fisheries and logging operations;
iii) Improving habitat and species conservation; and
iv) Developing effective marine protected areas.

CORDIO – CORAL REEF ECOLOGY IN EAST AFRICA

Since its inception, CORDIO has worked in four core areas, below:

i) Coral reef ecological monitoring and research – focussing on establishing trends in coral reef health, and research into critical aspects of reef ecology. Major themes include coral bleaching patterns, coral recruitment, fish community structure and coral/zooxanthellae symbiotic interactions.
ii) Fish and fisheries – monitoring of fish catch and resource populations, often with resource users as participants and partners, to determine how global and local threats combine to affect the livelihoods of people dependent on coral reef resources.
iii) Socio-economic monitoring and research – work is focussing on the development of a socio-economic monitoring methodology that is low-cost and sustainable, based on resource user participation, and appropriate to the needs of coral reef and fisheries managers.
iv) Education and awareness – training and capacity building of resource users, through participation in monitoring and research, and through targeted education programmes. Additionally, materials targeting schools and the general public are being developed. Research and monitoring results are reported in formats suitable for managers and policy makers in government, as well as the scientific community.

WCS (CORAL REEF RESEARCH PROJECT) - CORAL REEF ECOLOGY

The Wildlife Conservation Society (WCS) has programmes in Kenya, Tanzania and Madagascar. In Mombasa (Kenya), the WCS Coral Reef Conservation Project was started in 1986 to study the effects of human influences on Kenyan coral reefs. The project is hosted in the country by Kenya Wildlife Service and through long-term research clearance authorized by Kenya's Ministry of Science and Technology. The five major objectives of the Coral Reef Conservation Project are to:

1) Determine the effects of marine parks, global climate change, fishing, and indigenous management on marine fish catches, species diversity and reef ecology
2) Develop methods to restore coral reefs that have been degraded by heavy fishing, pollution or coral bleaching
3) Assist the organization of relevant government agencies and social organizations in developing sustainable resource use of coral reefs
4) Foster the professional development and training of marine scientists in coral reef ecology and management practices, and
5) Contribute to the coordination and general development of coral reef conservation and science in the tropics.

PACT KENYA –

Pact Kenya is a capacity building organisation and over the course of its eight or so years of existence, it has done its core work within a number of different programs addressing varying issues and sectoral themes. If it is to become excellent it has to make strategic choices and develop key competencies for impact. For the period 2008 to 2012 Pact Kenya has chosen to work in four strategic thematic platforms. These are in Democracy and Governance, Women's Empowerment, Conflict Management, and in the Environment and Natural Resource Management. Some of the relevant partners are:

i) Kenya Wildlife Service (Kisite-Mpunguti Marine Park & Reserve)
ii) Ministry of Fisheries

iii) Kenya Sea Turtle Conservation Committee (KESCOM)
iv) Ministry of Agriculture
v) Tiwi Diani Chale Management Trust (TDCMT
vi) Msambweni Turtle & Marine Conservation Group (MTMCG)
vii) Simakeni Environmental Group (SEG)
viii) Kwale County Council
ix) Beach Management Units(BMUs)
x) Kenya Forest Service (KFS)

RECOMAP – COMMUNITY BASED TRAINING PROGRAMMES

Result 3:

Capacity building is a core component of Regional Programme for the Sustainable Management of the Coastal Zones of the Indian Ocean Countries (ReCoMaP), and there are 3 main strategies to deliver this aspect of the programme: -

i) Strengthening of the capacity of regional training institutions to be able to provide suitable courses for planners, managers and technicians working in the coastal zone;
ii) The provision of financial support to individuals wishing to attend specific training events; and,
iii) ReCoMaP-managed training events.

Strategy 1: Strengthening of the capacity of regional training institutions to be able to provide suitable courses for planners, managers and technicians working in the coastal zone:

i) In order to best target the available resources for substantive support to selected regional training institutions, or so-called 'Centres of Excellence', the programme has recently initiated a Training Demand & Supply Assessment in all partner countries.
ii) On the one hand, the study seeks to identify what is the demand in terms of specific courses, as well as the favoured method and location of delivery (short-courses vs full-time courses; attendance at national centres vs regional centres). The programme is also seeking to understand the demand from potential centres of excellence for investments in course materials, equipment etc.
iii) On the other hand, the study is identifying the supply of training opportunities including the types of courses currently on offer, their mode of delivery, and the extent to which the institutions attract students from across the region and the nature of financial support available for students.
iv) ReCoMaP is currently analyzing the results from the TDSA and will design its support accordingly for implementation in 2009/2010.

Strategy 2: The provision of support to individuals wishing to attend specific training events:

i) ReCoMaP has supported, and will continue to support, individuals to attend specific training/capacity-building events (e.g. JRC Ocean Colour; WIOMSA Scientific Symposium; IMS MSc course etc.). But many capacity-building activities are in fact integral components of other ReCoMaP activities and these are therefore described on their respective pages of this website. For example, support to Marine Protected Areas (MPA) management capacity-building is detailed under Result 1 (MPAs: WIO-COMPAS).

Strategy 3: ReCoMaP-driven training events:

i) The third strategy is based on ReCoMaP-driven events, events which the programme itself designs and delivers. Again, many of these are integrated into other result area webpages. For example, a major contribution to capacity-building for ICZM is described under

Result 4: Regional and National ICZM Short Courses:

i) ReCoMaP has also delivered a series of national solid-waste management workshops, building on the production of a set of Solid Waste-management Guidelines and a training event on the use of the COREMO-3 coral reef monitoring database developed by ARVAM in La Reunion on Sustainable Management of Coastal Resources and the Environment. Most recently, ReCoMaP organised GIS Training in Rodrigues under Monitoring, Assessment & Management Tools.

4.0 NATIONAL NEEDS AND CAPACITY FOR MEETING THEM

3. ASCLME Project

The activities within the ASCLME Project are focused on filling the significant coastal and offshore data and information gaps for these LMEs by capturing essential information relating to the dynamic ocean atmosphere interface and other interactions that define the LMEs, along with critical data on artisanal fisheries, larval transport and nursery areas along the coast. More specifically, the ASCLME project is designed to collect, compile and analyze the existing literature, published literature and grey literature to be stored in a National Database System. Similarly, new data from cruises, shore-based monitoring, other programmes and historical data are expected to contribute to the same National Database System.

The overall objective of data capture and creation of a National Database System is to deliver a Marine Ecosystem Diagnostic Analysis (MEDA) for each participating country, a regional Transboundary Diagnostic Analysis (TDA), and Strategic Action Programme (SAP) for the Agulhas Current LME (South Africa, Mozambique, Comoros, Seychelles, Madagascar and Mauritius), and the Somali Current LME (Somalia, Kenya and Tanzania), which can be expanded when governance within the northern portion of the Somali LME becomes more stable. The parallel UNEP and World Bank Projects (WIO-LaB and SWIOFP) will also feed pertinent information into the TDA/SAP formulation process, and assist in the identification of policy, legal and institutional reforms and needed investments to address transboundary issues. Collectively, the projects build foundational capacities at regional scale for management of the LMEs.

The ASCLME project Capacity Building and Training (CB&T) needs, requirements and plans therefore complements the National policies and strategic plans on education, training and research in Kenya. Some of the main areas of capacity building in Kenya that cut across the ASCLME, WIO-LaB, SWIOFP and KCDP with respect to marine and coastal resources are describe briefly.

5.0 TRAINING REQUIREMENTS AS PER MEDA DELIVERABLES

5.1 Review of the MEDA template and its requirements

Data and Information Coordinators for each country are expected to take primary responsibility for product delivery, with specialists giving input in key areas. Coordinators are responsible for determining the level and nature of support (funding, advice and/or meetings) provided by the ASCLME Project to enable the delivery of products on time. The expected coverage for information includes:

i) Extended bibliography
ii) National metadata bases
iii) National data holding at data centres on:
    a) Fisheries
    b) Oceanography
    c) Census
    d) Environmental data
iv) MEDAs
v) National Ecosystem Atlas

The national Marine Ecosystem Diagnostic Analyses (MEDAs) will be the synthesis of all current knowledge of the coast and ocean, related to ecosystem management. Information and data for the national MEDAs will be sourced from published literature, data collected in the field, and/or mined from unpublished data and document repositories. The MEDA will also identify knowledge gaps and make recommendations for targeted activities to add to our knowledge of regionally important issues or ecosystem processes. These proposed activities will be rated on a scale of importance so that the Project Coordination Unit (PCU) can consider assistance towards addressing priority issues through early action, or incorporate recommendations into the SAP for implementation after the first phase of the ASCLME Project.

New data will be collected from both ship and shore-based expeditions, processed, and then the written-up will be subjected to peer-review and publication. The principles and guidelines for ASCLME data and information management, as agreed by ASCLME participating countries, provides a comprehensive information and data management plan including the handling of new data collected with ASCLME Project funding.

5.1.1 Repatriation of existing data to Western Indian Ocean countries

As outlined in the project document, repatriation of existing data to the Western Indian Ocean countries will be through specific requests, facilitated by the ASCLME. Experiences and successes of the Global Ocean Data Rescue and Archaeology (GODAR) project of the IOC/UNESCO will be taken into account. Data sets required for repatriation will be identified during the course of development of the MEDAs.

Archiving and long term management of information systems and data sets sourced at national level will remain the responsibility of the national institutions. The primary sources of information for the MEDA are from national institutions or NGOs or documented activities. Information/data will not be removed from their original source, and management systems will not be duplicated. For this reason, the focus of the ASCLME Project will be on synthesising and describing information (increasing awareness of information resources), promoting access to information, and supporting the good management and curation of existing data and information (through capacity building and training). The main users of scientific information in the LME process will be managers and scientists from national

management and governance agencies, which will need to draw on these sources of information to inform management/governance strategy and develop policy briefs.

5.1.2 Extended bibliography

During the course of development of the MEDAs, numerous articles and papers, both published and unpublished, will be reviewed and used as sources of information. It will be useful to participating countries to have access to a database or extended bibliography of literature on LME-related issues, with detailed annotations on the content of literature entries.

Bibliographies should be maintained by a national institution (with offline and online access), but should be ultimately accessible via a regional, internet-based portal. Input has been solicited from the IOC/UNESCO, UNEP, ReCoMaP, WIOMSA and SAEON regarding the adoption of an existing system OR the development of a database specifically for ASCLME purposes. The use of WEBLIS by SWIOFP and the resources in IOC portals and WIOfish are also acknowledged. The choice of a system is an item on the agenda of the 2nd working meeting of Data and Information Coordinators (February 2009), after which an implementation plan will commence.

5.1.3 Metadatabases

A metadatabase is required for each country to track data sets that are used by the ASCLME Project in support of the MEDA, as well as in the development of national data products. Most participating countries have one or more marine-related metadata portals already implemented. Regional discussion about the overlap and synergies between portals developed by UN agencies in the Western Indian Ocean is already underway, particularly with the Nairobi Convention Clearinghouse Mechanism and ODINAFRICA (IOC/UNESCO).

Instead of developing a new, parallel system for the ASCLME Project, it is recommended that in each participating country, one of the existing discovery metadatabase systems already in place, be adopted as an interim measure (adopted as permanent if successful) for the ASCLME Project. This is on condition that the chosen system complies fully with published ISO and OGC standards, so that metadata portals are interoperable, irrespective of their operating systems and software. The proposed national metadatabase, and requirements for support (if any) from the ASCLME Project should be drawn up in each National Data and Information plan. While it is acknowledged that SWIOFP proposed to use Marine Environmental Data Information (MEDI), (IODE/UNESCO) (SWIOFP 2003), SWIOFP is now using Geonetwork.

If an existing metadatabase is used, a flagging system must be implemented to indicate data sets which are:

a) Of relevance to the ASCLME Project, and
b) Have been entered into the system on behalf of the ASCLME Project.

This is necessary so that data inventories relevant to the ASCLME can be generated quickly and also so that work progress (the describing of additional data sets) can be monitored. in countries where no functional metadatabase currently exists to serve the needs of the marine/coastal community, or where funding is required to make such a system fully functional, this should be specified in the national Data and Information Plan.

The ASCLME PCU will continue to work closely with ODINAFRICA (IOC/UNESCO), the Nairobi Convention Clearinghouse Mechanism and SWIOFP, to ensure that any targeted interventions that are

necessary to increase access to coastal and marine-related metadata are done in the best interests of the region. Interoperability of metadata portals, funding, and participation in the International Coastal Atlas Network (ICAN) will also be addressed at Data and Information meetings of regional projects.

5.1.4 ASCLME new data inventory

New data will be generated mainly from three sources:
1. Ship-based expeditions
2. Shore-based expeditions
3. Ongoing data collection for monitoring purposes

The ASCLME PCU will maintain an online inventory of these data sets for the reference of all Project participants. National Data and Information coordinators will maintain their national inventories of monitoring data against a regional template. The data inventory for ship-based expeditions has been designed and is currently being populated with metadata from the 2008 NANSEN cruises. Templates for shore-based expeditions and monitoring data will only be drawn up at the implementation stage.

5.1.5 WIO Projects database

A spreadsheet has been compiled of projects active (in more than one country) in the WIO that have some relevance to the ASCLME Project. This has been compiled by the ASCLME Project Coordinating Unit (PCU). There are currently more than 120 projects being implemented in the WIO in more than one country. Each country should contribute a list of projects at national or local level to complement the regional list. This will form part of the National Data and Information Plan.

A more detailed document entitled Summary of WIO regional projects has been compiled, also by the ASCLME PCU, to describe in detail the activities of key projects and areas of potential collaboration along thematic lines. Further contributions to this document are welcome, and regular updates will be made available online.

5.1.6 Information products

A series of products for the dissemination of ASCLME ecosystem-related data and information should be developed. All of these products will be developed by the ASCLME Project itself. It was proposed that all of these information products be accessed via an overarching Ecosystem Portal for access to information about the ASCLME, as well as for the ongoing monitoring and evaluation of LMEs, and tracking of the implementation of the SAP. This portal should also facilitate ecosystem monitoring (through the use of indicators). Note was taken of the Benguela Current Large Marine Ecosystem (BCLME) Project portal (SEIS) which also has a link to near-real time satellite imagery.

Considering that ecosystem-level portals have already been implemented for various related purposes, this should be adopted or developed together with other UN agencies such as UNEP, IW Learn-GEF, IOC/UNESCO and other conventions such as the Nairobi Convention. Dialogue with these other agencies has already commenced; any further implementation is likely during 2010-2011.

5.1.7 Bibliographies, metadata and in-situ instrumentation portals

The extended bibliographies and metadatabase activities were planned for implementation in 2009 while the new data inventory was expected to be implemented in 2008. For all the WIO Project database portal(s), the interim site hosted by ASCLME, was expected to be discussed with the Forum,

particularly WIOMSA, Nairobi Convention Secretariat and IOC/UNESCO and implemented by the year 2008.

Resolution from on the cruises portal was to have an interim site hosted by ASCLME and the long-term home was proposed for discussion at the Forum, particularly WIOMSA and IOC/UNESCO. The year of implementation was expected to be 2009.

Resolution from Mauritius proposed a portal of in-situ instrumentation in the WIO region with an interim site hosted by ASCLME and the long-term home was proposed for discussion at the Forum, particularly WIOMSA and IOC/UNESCO. The year of implementation was expected to be 2009.

5.1.8 Publications

Peer reviewed papers will be published by scientists and participants in project activities throughout the life of the project. MEDAs and national data products should be taken to publication if appropriate.

5.1.9 ASCLME reports

The production of official ASCLME reports including the MEDAs, TDA and SAP are key deliverables of the project. Cruise reports should be published as an important resource additional to scientific publications that come from cruises.

5.1.10 Data Products

Value added model products, spatial data products, habitat maps and other data sets will be developed by the ASCLME project during 2009-2012.

5.1.11 National ecosystem atlases

Spatial information describing the status of resources, and/or monitoring ecosystem change should be packaged and disseminated in appropriate forms for the ASCLME participating countries. Marine Spatial Planning (MSP), with a particular focus on an ecosystem-based approach to managing human activities in the marine environment, will be a core element of the SAP.

National ecosystem atlases in support of disseminating information and monitoring change should be developed by each country. Since some countries have already developed national marine atlases, coastal atlases, or sensitivity atlases/maps, the requirements for spatial products will differ by country. Content should be related to priority issues in MEDAs. The development of these products should take place as a dedicated activity after the MEDAs have been compiled, and once data reviews are complete. It will be important to plan these national products in conjunction with the Nairobi Convention Clearinghouse Mechanism and African Marine Atlas (IOC/UNESCO), which are funding related activities. Activity is suggested for 2010-2011.

5.1.12 Communications strategy materials

The ASCLME communications strategy, incorporating DLIST and the ASCLME website, will need to draw from other information products.

5.1.13 Policy briefs

These should be developed together with key project partners.

5.1.14 Training reviews

Information collected during the training and capacity building exercise, on current training activities in participating countries, should be made available online.

5.1.15 ASCLME website

As part of the ASCLME communications strategy, the ASCLME website is an important portal for the dissemination of information, in conjunction with other websites such as DLIST and IW-Learn.

5.2 Training Requirements

Based on the Training Needs Assessment (TNA), Training Gap Analysis (TGA), MEDA priority activities and the existing capacities within the training institutions, a technical evaluation of training requirement was carried out (Table 13) for each of the modules:

i) For the Fish and Fisheries Module
ii) Pollution and Ecosystem Health Module

The evaluation of the training requirements for these modules facilitated a detailed analysis of the training requirements by thematic areas of the workplan (Table 14). Using this approach, the required training, the possible courses to be undertaken and the suitable institutions were thus identified.

Table 13: Priority areas and priority training needs vs training requirements as per ASCLME work-plan

For the Fish and Fisheries Module	Training Requirements	Training Needs Assessment
1. *Larval transport*	Biological Oceanography Fish Biology and Taxonomy Fish Genetics GIS Tools	Ph.D Fisheries Biology
• Particularly little knowledge exists for the Somali Current LME;		
• Recruitment is poorly understood;		
• Need to design spatial management tools.		
2. *Trophic relationships –Including biodiversity and alien species*	Marine Ecology Taxonomy and Genetics	
3. *Fishery interdependent surveys;*	Stock Assessment Physical Oceanography	Ph.D Marine Biology
• Biodiversity – poorly quantified and studied;		
• Bottom topography – information lacking.		
3. *Toxic tides and algal blooms*	Biological Oceanography Environmental Chemistry	
4. *Systems functioning and relationship to fisheries*	Fisheries Management Marine Ecology	Ph.D Marine Ecology
5. *Industrial fisheries in relation to artisanal and subsistence fishery - need for optimization of the resource (food security issue);*	Natural Resource Economics Fisheries Socio-economics	
6. *Impact of the fishery on biodiversity;*	Marine Ecology Biology of Conservation	
7. *Value of non-consumptive use and the inter-face with consumptive use; and*	Fisheries Socio-Economics	Ph.D Fisheries Economics
8. *Commercial and subsistence landings or effort.*	Stock Assessment Fisheries Statistics	
Pollution and Ecosystem Health Module		
1. *Anthropogenic threats*	Environmental Science Environmental Economics Environmental Impact Assessment Environmental Chemistry Fish Stock Assessment Fish Population Dynamics Conservation Biology and Biodiversity	
• Mangrove degradation – not quantified or understood;		
• Fire: nutrients and erosion – not quantified or understood;		
• Tourism induced threats – not quantified or understood;		
• Development of sandy beaches – not quantified or understood;		
• Urban areas: solid waste/effluent – not quantified;		
• POPS/bioaccumulation: hot spots, urban rivers – not comprehensively identified, quantified;		
• Petroleum spills, heavy metals and pesticides – needs to be		

quantified;		
• Coastal aquaculture – synthesis of existing extent and impacts, and prospects for future development needed;		
• Effects of fishing methods – little or no information available;		
• Ballast water alien species – extent and effects largely unknown;		
2. *Natural perturbation*		
• Erosion: wave action/tide flux and accretion – extent and effects not quantified;	Marine Geology Marine Ecology Environmental Science & Climate Change	M. Sc Marine Geology
• Climatic patterns need to be more effectively described and understood;		
• Coral bleaching and mortality – causes not well understood, mitigation strategies need to be explored;		
• Thermal fluctuations – extent and effects poorly understood;		
• ENSO induced fluctuations in the large current systems – extent and effects poorly understood;		
3. Conjunction effects of I. and II.		
• Indicators of environmental health – need to be developed;	Geospatial Analysis Ecosystem Modelling Ecosystem Approach to Fisheries Management	
• Transboundary movements of water and pollutants – needs to be charted.		

Table 14: Priority modules, gaps and priority training needs vs training proposal as per ASCLME work-plan

Module	Description	Role of ASCLMEs Project	Priority Training Proposal	Required Training
Productivity	Identification of productivity hotspots, trophic relationships, temporal variability, riverine and upwelling inputs, toxic tides and algal blooms, inter and intra systemic linkages, roles of gyres and eddies, and monsoon and atmospheric conditions.	The ASCLMEs Project through cruises and the purchase of state of the art measuring devices will map productivity hotspots, gather necessary information to gauge temporal variability, and gain understanding of the inter and intra-systemic linkages as needed to inform management decisions at regional level.	Ph. D. Marine Ecology	Biological Oceanography Physical Oceanography Fish Biology and Taxonomy Fish Genetics GIS Tools Biological Oceanography Environmental Chemistry Fisheries Management Marine Ecology Biology of Conservation
Fish and Fisheries	Larval transport, trophic relationships, fishery interdependent surveys, systems functioning and relationship to fisheries, industrial fisheries and their relationship to artisanal and subsistence fisheries, the impact of fisheries on biodiversity, the value of non-consumptive use and the interface with consumptive use, and commercial and subsistence landings and effort.	ASCLMEs Project will contribute information to the SWIOFP project on the issue of larval transport in key currents.	Ph. D Marine Biology Ph. D. Fisheries Biology	Marine Ecology Taxonomy and Genetics Marine Ecology Biology of Conservation Fisheries Socio-Economics Stock Assessment Fisheries Statistics
Pollution and Ecosystem Health	Identification of anthropogenic threats, natural perturbation, and the conjunction effects of anthropogenic threats and natural perturbation that relate to ecosystem health.	The ASCLMEs Project will address issues of pollution through assessment of heavy metal and POPs concentrations in key indicator species. It will also assist WIO-LaB, through cruises, in assessing pollution from land-based sources.	M.Sc. Marine Geology	Marine Geology Marine Ecology Environmental Science Geospatial Analysis Ecosystem Modelling Ecosystem Approach to Fisheries Management

Socio-economic Module	Integrated assessments of human forcing at the LME level and attainment of long-term socio-economic benefits, tasks that are integrated into the outcomes and activities of each of the projects within the PA.	The ASCLMEs Project public participation Outcome will involve stakeholders in dialogue about measures to sustain livelihoods while sustaining the long-term productivity of marine resources.	Ph.D Fisheries Economics	Natural Resource Economics Fisheries Socio-Economics Environmental Economics
Governance Module	Addresses Regional Governance issues including institutional development, regional and national level capacity building, stakeholder participation, and adaptive management strategies.	The ASCLMEs Project will convene representatives of the projects of the Programme, governments, regional organizations and other stakeholders as appropriate to agree on cooperative governance systems for management, as part of the process of finalizing the SAP.		Environmental Law Public Administration Sociology

Module	Required Training	Priority Training	Possible Course	Priority/Institution
Productivity	Biological Oceanography	Ph. D.	Ph. D Marine Ecology	MU
	Physical Oceanography	M. Sc.	Ph. D. Fisheries Management	MU
	Fish Biology and Taxonomy	Certificate	Ph. D. Environmental Chemistry	
	Fish Genetics	Diploma	M. Sc. Remote Sensing and GIS	UON
	GIS Tools		M. Sc. Conservation Biology	UON
	Environmental Chemistry		M. Sc Genetics	
	Fisheries Management		M. Sc. Hydrobiology	UON
	Marine Ecology		Certificate in ICT and GIS	JKUAT
	Biology of Conservation		Diploma in ICT and GIS	JKUAT
Fish and Fisheries	Marine Ecology	Ph. D.	Ph. D Marine Ecology	
	Taxonomy and Genetics	M. Sc.	Ph. D. Fisheries Management	
	Stock Assessment	Certificate	Ph. D. Environmental Chemistry	
	Marine Ecology	Diploma	Ph. D Fisheries Economics	KU
	Biology of Conservation		M. Sc. Remote Sensing and GIS	UON
	Fisheries Socio-Economics		M. Sc. Conservation Biology	UON
	Stock Assessment		M. Sc Genetics	
	Fisheries Statistics		M. Sc. Hydrobiology	
			M. Sc. Applied Statistics	UON/MMUST
			Certificate in ICT and GIS	JKUAT
			Diploma in ICT and GIS	JKUAT
Pollution and Ecosystem Health	Marine Geology	Ph. D.	B. Sc. Environmental Education	KU
	Marine Ecology	M. Sc.	M. Sc. Marine Geology	UON
	Environmental Science	Certificate	M. Sc. Chemical Oceanography	
	Geospatial Analysis	Diploma	M. Sc. Remote Sensing and GIS	MU/UON
	Ecosystem Modelling		M. Sc. Fisheries Management	MU/UON/KU
	EAF		M. Sc. Environmental Chemistry	MU/UON/KU/EGER
			M. Sc. Environmental Science	JKUAT
			Certificate in ICT and GIS	JKUAT
			Diploma in ICT and GIS	JKUAT
			Certificate in EIA	KU

Socio-economic Module	Natural Resource Economics Fisheries Socio-Economics Environmental Economics	Ph. D. M. Sc. Certificate Diploma	Ph. D Fisheries Economics M. Sc Fisheries Economics M. Sc Natural Resource Economics M. Sc. Economics	 MU/OUN
Governance Module	Environmental Law Public Administration Sociology Language	Ph. D. M. Sc. Certificate Diploma	LL. B LL. M M. Sc. Environmental Law M. A Public Administration M. A Languages M. Sc. Public Relations	MU/KU UON UON MMUST EGER MMUST

6.0 REGIONAL AND INTERNATIONAL LINKAGES AND SUPPORT

i) There are a number of regional and international management organizations that will play a key role in the implementation of both MEDA and SAP from the results of ASCLME activities. Some of these organizations include:
   a) Indian Ocean Tuna Commission (IOTC)
   b) East African Community (EAC)
   c) International Whaling Commission (IWC)

ii) Existing regional programmes in marine sciences, including marine ecology, fisheries and oceanography in the East Africa Marine Eco-region (EAME)
   a) South Western Indian Ocean Fisheries Project (SWIOFP)
   b) Kenya Coastal development Project (KCDP)

iii) Regional and International Commissions relevant to the ASCLME
   International Whaling Commission (IWC)
   Indian Ocean Tuna Commission (IOTC)

iv) Relevant International Conventions and Agreements relevant to the ASCLME Project
   a) United Nations Convention on the Law of the Sea (UNCLOS)
   b) Convention on the International Trade in Endangered Species (CITES)
   c) Convention on Biological Diversity (CBD)
   d) Food and Agricultural Organization (FAO) Code of Conduct for Responsible Fisheries
   e) World Trade Organization (WTO)

v) Existing regulatory mechanisms within in management of LME in the EAME and Internationally.

vi) Regional and International Policy frameworks in Marine Sciences relevant to the ASCLME Project.

7.0 PROPOSED START-UP TRAINING PROJECTS (PRIORITIES) AND ACTIVITIES WORK PLAN AND BUDGET ESTIMATES (INCORPORATION INTO SAP WHERE APPROPRIATE)

Required Training for MEDA and SAP

Based on the training needs assessment, existing training capacity, the ASCLME priority research areas and the MEDA/SAP deliverables, the training and capacity building activities would address key priority areas in data management before venturing into the ecological oriented training to enable the setting up of the necessary supporting documentation (data entry, storage, archiving and analysis) to facilitate the development of the ocean-atmosphere-land interactions. In this regard, the following training activities should be undertaken:

Table 15: Required training for MEDA and SAP under the ASCLME Programme

Module	Required Training	Institution	Staff	Number
ASCLME Support Service	Certificate in ICT and GIS	JKUAT	Technical	2
	Diploma in ICT and GIS	JKUAT	Technical	1
	Diploma in ICT and GIS	JKUAT	Research	1
	M. Sc. Remote Sensing and GIS	UON	Research	1
Productivity	Ph. D Marine Ecology	MU	Research	1
	Ph. D. Environmental Chemistry	MU	Research	1
	M. Sc. Chemical Oceanography	?	Research	1
Fish and Fisheries	Ph. D. Fisheries Management	MU	Research	1
	M. Sc. Conservation Biology	UON	Research	1
	M. Sc. Applied Statistics	UON/MMUST	Research	1
Pollution & Ecosystem Health	B. Sc. Environmental Education	KU	Research	1
	M. Sc. Environmental Science	JKUAT	Research	1
	M. Sc. Environmental Chemistry	MU/UON/KU/EGER	Research	1
Socio-economic Module	Ph. D Fisheries Economics	KU	Research	1
	M. Sc Natural Resource Economics	MU/OUN	Research	1
Governance Module	M. Sc. Environmental Law	MMUST	Research	1
	M. A Public Administration	EGER	Research	1
	M. A Languages	MMUST	Research	1
	M. Sc. Public Relations	UON	Research	1

Proposed Training Schedule and Envisages Costs for MEDA and SAP

Certificate and Diploma

These training activities should be staggered by six months at least so that staff are available in shifts to carry out ASCLME activities as part of their field report requirements by the training institutions. This means that first applications should be done in June/July and admission in August so that the first semester/term of 16 to 16 weeks is completed before December and the second semester/term completed by April/May of the following year. As the Certificate Holders return to work, the Diploma students will also be available during the long holidays up to August and will be able to engage in the project activities for at least two months and gain more experience for their dissertations at the host institutions (Table 16).

Table 16: Envisaged Training Time schedule and Cost for MEDA and SAP under the ASCLME Programme

Required Training	Time in Months										Tuition	Stipend	Total
	6	12	18	24	30	36	42	48	54	60			
Certificate in ICT and GIS											100,000	240,000	340,000
Diploma in ICT and GIS											80,000	240,000	320,000
Diploma in ICT and GIS											80,000	240,000	320,000
B. Sc. Environmental Education											150,000	360,000	510,000
M. Sc. Remote Sensing and GIS											300,000	240,000	540,000
M. Sc. Chemical Oceanography											300,000	240,000	540,000
M. Sc. Conservation Biology											300,000	240,000	540,000
M. Sc. Applied Statistics											300,000	240,000	540,000
M. Sc. Environmental Science											300,000	240,000	540,000
M. Sc. Environmental Chemistry											300,000	240,000	540,000
M. Sc Natural Resource Economics											300,000	240,000	540,000
M. Sc. Environmental Law											300,000	240,000	540,000
M. A Public Administration											300,000	240,000	540,000
M. A Languages											300,000	240,000	540,000
M. Sc. Public Relations											300,000	240,000	540,000
Ph. D Marine Ecology											300,000	300,000	600,000
Ph. D. Environmental Chemistry											540,000	300,000	840,000
Ph. D. Fisheries Management											540,000	300,000	840,000
Ph. D Fisheries Economics											540,000	300,000	840,000
Total											5,630,000	4,920,000	10,380,000

Bachelor of Science

The main Bachelor of Science training identified should focus on Environmental Education. The training for this staff should target those who are holders of Ordinary Diploma or Higher National Diploma qualifications. This will enable the staff to complete their training in 3 or 2 years for the respective qualification and depending on the admission requirements for individual universities and schools.

Masters of Science and Masters of Arts

For the science based programmes, at least three participating staff should enrol for MSc programmes in the first year and the next three in the following year. This will mean that each of the three staff members will be away for only two semesters (6-8 months) and will carry out their MSc research work while on the project. This approach will ensure that the project does not experience handicaps due to staff unavailability. The M.A trainings should enrol two staff members every year for the same reason that staff will be available for the project activities.

Doctorate Programmes

The Ph. D Programmes normally require staff members to undertake residential course work for at least 2 semesters (6-8 months) before embarking on their research. There are however provisions that candidates with experience and who have published in their areas of research could get a course work waiver on evaluation of their application for such exemptions. Two or one year staggering of two enrolments at a time would be appropriate in view of requirements that project activities do not stall because of training or capacity building activities.

8.0 ACKNOWLEDGEMENTS

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10.0 APPENDICES

A. Contact addresses of universities and tertiary education institutions in Kenya

PUBLIC UNIVERSITIES

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Nairobi,
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Nairobi Province, University Way/Uhuru Highway
Telephone: (+254 - 20) 318262
Fax: (+254 - 20) 245566
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Kenyatta University

Jomo Kenyatta University of Agriculture and Technology
P.O. Box 62,000 – 00200
Nairobi,
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Nairobi Province, Nairobi-Thika Road, Juja-Main Campus
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Fax: +254-06752164
Email: pro@jkuat.ac.ke

Fax: 254 067 52446
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Website: http://www.jkuat.ac.ke/

Moi University
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P.O. Box 3900 30100
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Fax: +254-(0)53-43047
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Egerton 20115
KENYA
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254-051-2217781
Email: info@egerton.ac.ke
Website:

Maseno University
Private Bag
Maseno,
KENYA
Nyanza Province, Kisumu-Busia Road, Maseno
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Fax: +254 57 351221
Website: http://www.egerton.ac.ke/

Masinde Muliro University of Science and Technology
P.O Box 190 50100
Kakamega
KENYA
Western Province, Kakamega-Webuye Road
Tel.: +254 - 056- 31375
Fax: +254 - 056 – 30153
Website: http://www.mmust.ac.ke/

PRIVATE UNIVERSITIES

Strathmore University
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Madaraka Estate, Ole Sangale Road
Tel.: (+254) (0)20-6006155
Mob.: (+254) (0)722-205428, (0)733-618135
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http://www.strathmore.edu

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Fax: +254.20.360 6100/101
+254.20.8562017
Website: http://www.usiu.ac.ke/

Catholic University of Eastern Africa
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Nairobi
KENYA.
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Wireless: +254-020-2525811-5
Mobile:+254-722-509-811-2,
+254-724-253-733/4,
+254-733-900-025/6/7
Fax: +254-20- 8891084 & 8891261
Website: http://www.cuea.edu/

KCA University

P.O. Box 56808
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Thika Road, Ruaraka
E-mail: registrar@kca.ac.ke
Tel.: +254 20-3537842, +254 20-8070408, 020-8070409
Fax: +254 20 8561077
Mobile Phone Number: +254 710888022, +254 734888022
Website: http://www.kca.ac.ke/

Africa Nazarene University

P.O. Box 53067
Nairobi 00200,
KENYA
Website: http://www.anu.ac.ke/

Kenya Methodist University

KENYA METHODIST UNIVERSITY
P.O. Box 267, Meru, Kenya
Tel: 064-30301/30367/31171/31146/31229
Safaricom: 0724-256162
Zain: 0734-310655
Wireless: 020 21184234/5/6/7
Fax: 064-30162
Email: info@kemu.ac.ke
Website: http://www.kemu.ac.ke/

University of Eastern Africa, Baraton

P.O Box 2500
Eldoret
KENYA
Email: Admissions - admissions@ueab.ac.ke
Website: http://www.ueab.ac.ke/

Great Lakes University of Kisumu

P.O.BOX 2224 - 40100,
Kisumu,
KENYA .
TEL: +254- 57- 2023972 / +254- 57- 2024577
Email: info@gluk.ac.ke
Website: http://www.gluk.ac.ke/

Kabarak University

Website: http://www.kabarak.ac.ke/

St. Paul's University

P.O. Private Bag
Limuru - 00217
KENYA
Tel: +254 - 20 - 2020505 / +254 - 20 - 2020510
Fax: +254-66-73033
Email: assistantregistrar@stpaulslimuru.ac.ke
Email: registry.postgraduate@stpaulslimuru.ac.ke
Website: http://www.stpaulslimuru.ac.ke/

Daystar University
P. O. Box 44400-00100
Nairobi,
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Website: http://www.daystar.ac.ke/

Kiriri Women's University of Science and Technology
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Website: http://www.kwust.ac.ke/

Pan Africa Christian University
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Nairobi,
KENYA
Tel: +254 20 2013146 /2076894 /6752910
Mobile: +254 721932050 /0734400694
Email:enquiries@pacuniversity.ac.ke
Website: http://www.pacuniversity.ac.ke/

MIDDLE LEVEL COLLEGES

Bandari College – Mombasa
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Website: http://www.kenyaforestservice.org/kfc/

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Telkom wireless – 0202375340
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Human Resources: hr@kia.ac.ke
Training: training@kia.ac.ke
Customer Care: customercare@kia.ac.ke
Website: www.kia.ac.ke/

Kenya Institute of Professional Studies - Nairobi
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Website: http://www.kips.co.ke/

Kenya Institute of Special Education (KISE) - Kasarani, Nairobi
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Kenya School of Monetary Studies - Ruaraka, Nairobi
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Website: http://www.utalii.co.ke/

Kenya Water Institute - South C, Nairobi
Webpage:
http://www.scienceandtechnology.go.ke/index.php?option=com_schools&Itemid=89&schoolid=139

Kenya Wildlife Service Training Institute- [Naivasha [8]
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Tel.+254-050-2020267/2020577/2021329
Fax.+254-050-2021328
E-mail: principal@kwsti.ac.ke
Webpage: http://www.kws.org/about/training/kwsti.html

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Fax: (+254 - 57) 2024710
Webpage: http://www.kisumupoly.ac.ke/index.php?option=com_content&view=article&id=54&Itemid=48

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Railway Training School - South B, Nairobi
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Tom Mboya Labour College, Kisumu
Website: http://www.tommboyacollege.co.ke/

B. Acronyms and Abbreviations

AA Monsoon	Asian-Australian Monsoon
ACEP	Africa Coelacanth Environment Programme
ACLME	Agulhas Current Large Marine Ecosystem
ASARECA	Association of Sustainable Agriculture Research in Eastern and Central Africa
ASCLMEs	Agulhas and Somali Current Large Marine Ecosystems
B.Sc	Bachelor of Science
BA	Bachelor of Arts
BCLME	Benguela Current Large Marine Ecosystem
BMUs	Beach Management Units
BTECH	Bachelor of Information Science
CB&T	Capacity Building and Training
CBD	Convention on Biological Diversity
CBOs	Community-based Organizations
CCRF	Code of Conduct for Responsible Fisheries
CCNA	Cisco Certified Network Associate
CIPS	Certified Institute of Purchasing and Supplies
CITE	Certificate in Information Technology Essential
CITES	Convention on the International Trade in Endangered Species
COI	Indian Ocean Commission
CORDIO	Coral Reef Degradation in the Indian Ocean
CPA	Certified Public Accountants
CPA	Certified Public Secretaries
CRC	University of Rhode Island Coastal Resources Centre
CUC	Chuka University College
DEAT	Department of Environmental Affairs and Tourism (South Africa)
DIM	Data and Information Management
DLIST	Distance Learning and Information Sharing Tool
DSS	Decision Support System
EAC	East African Commission
EACE	East Africa Certificate of Education
EAME	East African Marine Ecoregion
EET	Environmental Endowment Trust
EGER	Egerton University
EA	Environmental Audit
EIA	Environmental Impact Assessment
ENSO	El Niño Southern Oscillation
FAD	Fish aggregating device
FAO	Food and Agricultural Organization
GAP	Good Agricultural Practices
GCRMN	Global Coral Reef Monitoring Network
GEF	Global Environment Facility
GEMPA-EA	Group of Experts in Marine Protected Areas for Eastern Africa
GIS	Geographic Information System
GIWA	Global International Waters Assessment
GODAR	Global Ocean Data Rescue and Archaeology
GOOS	Global Ocean Observing System

GoK	Government of Kenya
GPA	Global Programme of Action for the Protection of the Marine Env. from Land-based Activities
GPS	Global Positioning System
HACCP	Hazard Analysis Critical Control Point
ICRAN	International Coral Reef Action Network
ICRI	International Coral Reef Initiative
ICT	Information and Communication Technology
ICZM	Integrated Coastal Zone Management
IFREMER	Institut Français pour la Recherche et l'Exploitation de la Mer
ILRAD	International Laboratories Research on Animal Diseases
ILRI	International Livestock Research Institute
IMIS	Institute of Management Information Sciences
IMS	Institute for Marine Sciences, Dar es Salaam, Tanzania
IOC	Intergovernmental Oceanographic Commission
IOTC	Indian Ocean Tuna Commission
ISO	Hazard Analysis Critical Control Point
IUCN	The World Conservation Union
IW	International Waters
IWC	International Whaling Commission
IW:LEARN	International Waters Learning Exchange and Resource Network
JAB	Joint Admission Board
JKUAT	Jomo Kenyatta University of Agriculture & Technology
KACE	Kenya Advanced Certificate of Education
KCDP	Kenya Coastal Development Project
KCSE	Kenya Certificate of Secondary Education
KES	Kenya Shillings
KESCOM	Kenya Sea Turtle Conservation Committee
KFS	Kenya Forest Service
KIPPRA	Kenya Institute of Public Policy Analysis
KMFRI	Kenya Marine and Fisheries Research Institute
KPUC	Kenya Polytechnic University College
KSUC	Kisii University College
KU	Kenyatta University
KUC	Kimathi University College
KWS	Kenya Widlife Service
KWSTI	Kenya Wildlife Training Institute
LL.B	Bachelor of Law
LL.M	Master of Law
LME	Large Marine Ecosystem
M&E	Monitoring and Evaluation
MA	Modular Approach to LME Management
MCM	Marine and Coastal Management Division of the DEAT (South Africa)
MCS	Monitoring Control and Surveillance
MDGs	Millennium Development Goals
MEDA	Marine Environmental Data Analysis
MEDI	Marine Environmental Data Information
MMUST	Masinde Muliro University of Science & Technology
MODIS	Moderate Resolution Imaging Spectroradiometer
MPA	Marine Protected Area

MPRU	Marine Parks and Reserves Unit
MPUC	Mombasa Polytechnic University College
M.Sc	Master of Science
MSP	Marine Spatial Planning
MSU	Maseno University
MTMCG	Turtle & Marine Conservation Group
MU	Moi University
MUC	Meru University College
NBSAP	National Biodiversity Strategy and Action Plan
NEAP	National Environmental Action Plan
NEMA	National Environment Management Authority
NEMC	National Environment Management Council (Tanzania)
NEPAD	The New Partnership for Africa's Development
NFP	National Focal Point
NGFPA	National Government Focal Point Agencies
NGO	Non-Governmental Organization
NMK	National Museums of Kenya
NOAA	National Oceanographic and Atmospheric Administration (USA)
NORAD	Norwegian Agency for Development Cooperation
NUC	Narok University College
OAU	Organization for African Unity
ORI	Oceans Research Institute (Durban, South Africa)
PA	Programmatic Approach for the Agulhas and Somali LMEs
PC	Project Coordinator
PDF	Project Development Facility
PhD/D.Phil.	Doctor of Philosophy
PIR	Project Implementation Review
POPs	Persistent Organic Pollutants
PPER	Project Performance and Evaluation Review
PRS	Poverty Reduction Strategy
PSC	Project Steering Committee
PUC	Pwani University College
QA	Quality Control
RECOSCIX	Regional Centre for Scientific Data Exchange
ReCoMaP	Regional Programme for the Sustainable Management of the Coastal Zones of the Indian Ocean Countries
SADC	South African Development Community
SAP	Strategic Action Plan
SCLME	Somali Current Large Marine Ecosystem
SeaWiFS	Sea-viewing Wide Field-of-view Sensor
SEG	Simakeni Environmental Group
SIDS	Small Island Developing States
SSP	Self Sponsored Programme
STAP	Science and Technical Advisory Panel of the GEF
SWIOFC	Southwest Indian Ocean Fisheries Commission
SWIOFP	Southwest Indian Ocean Fisheries Programme
TAFIRI	Tanzania Fisheries Research Institute
TDA	Transboundary Diagnostic Analysis
TDCMT	Tiwi Diani Chale Management Trust

TGA	Training Gap Analysis
TNA	Training Needs Assessment
TOR	Terms of References
TPR	Tri-partite Review
UN	United Nations
UNCLOS	United Nations Convention on Law of the Sea
UNESCO	United Nations Educational, Science and Cultural Organization
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNOPS	United Nations Office for Project Services
UON	University of Nairobi
URF	University Research Fund
WB	World Bank
WCS	Wildlife Conservation Society
WIO	West Indian Ocean
WIO-LaB	UNEPGEF Project: Addressing land-based activities in the Western Indian Ocean
WIOMSA	West Indian Ocean Marine Sciences Association
WIOTOC	Western Indian Ocean Tuna Organisation Convention
WMU	WIO-LaB Managing Unit
WTO	World Trade Organization
WWF	World Wide Fund for Nature

Rapid Training Needs Assessment for participating scientists

	M.Sc:	Ph.D:	Number
Fisheries & Aquatic Sciences	Aquatic Sciences	Requires	1
Geology	Requires		1
Fisheries & Aquatic Sciences	Aquatic Sciences	Requires	1
Fisheries & Aquatic sciences	Ecological Marine Management	Marine Biology	1
BA	MBA	Requires	1